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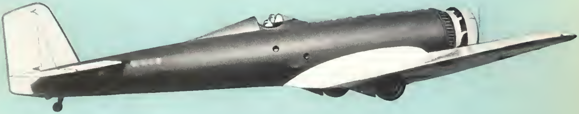
AVIATION

The Oldest American Aeronautical Magazine



SALESMANSHIP AND THE *Truth*

AERONAUTICAL USES FOR THE *X-Ray*

Organized AIRCRAFT REPAIRING

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Associate Editor

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Technical Editor

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AVIATION

The Oldest American Aeronautical Magazine

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Contents for June 28, 1930

Volume 28, Number 26

COMING

¶Welding Jigs and Fixtures ¶Two Cycle Aircraft Engines ¶Signing up the Business Market ¶Coming descriptions—Travel Air Low Wing Monoplane, Savoia-Marchetti amphibion

McGRAW-HILL PUBLISHING COMPANY, INC., Tenth Ave. at 36th St., New York, N. Y.

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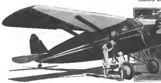
210 H. P. LYCOMING 4-Place Cabin Plane $5775

with Electric Self Starter

Especially built Acme Turret Lathe which turns cylinder heads for Lycoming airplane engines.



In the last stage of assembly. After motor is assembled it is put on testing block, run for five hours and taken down for inspections then re-assembled and again tested before ready for delivery

IT PAYS TO BE FIRST

Below—Special Lathe, for facing master rods. Work performed as finely as metal can be finished. Lathes further down are facing crank cases.

Stinson was first in 1926 with a completely enclosed cabin plane capable of flying itself in the air, equipped with brakes, heater and starter. Stinson is first today with a plane of value and price possible only when vast production resources, financial strength, experienced management and great buying power are concentrated upon the building and marketing of better planes for new, radically low prices. Stinson offers dealers even more than a plane that has no competition. Stinson creates public demand for private ownership of planes, opens vast new markets, makes it easier to buy a plane, makes it easy to learn to fly, and builds a permanent, profitable business. One of the important reasons that Stinson enjoys unquestioned leadership today is the fact that it controls the source of Lycoming engines. The reliability of Lycoming engines is a guarantee of the future possibilities of this organization. The Stinson management is backing its faith in aviation as a business with manufacturing plans, production provisions, and investments that dwarf all previous efforts.

DEALER franchise still open for right men in some localities.

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Three-fourths front view of the 9-cylinder Lycoming Radial Aircraft engine the R 680. Smoothness and quietness of operation have been developed to a high degree.

Three-fourths rear view of the Lycoming Aircraft engine. Lycoming has spent more than two years in developing this engine with reliability as the basis in every factor of design.

4-Pass.—225 H. P. Wright—$9,495 · 4-Pass.—225 H. P. Packard Diesel—$8,995 · 4-Pass.—300 H. P. Wright—$10,495—300 H. P. Wasp—$10,695 · 6-Pass.—300 H. P. Wright—$10,995—300 H. P. Wasp—$11,195 · 8-Pass.—425 H. P. Wasp—$15,995 · Stinson Airliner—10-Pass. Tri Motored Transport, $23,900. Prices F. O. B. Wayne, Michigan. Equipment other than standard, extra

There's a "sandwich" in this runway—*every twenty feet!*

An airport in Central Ohio—one of the stations of a national air transportation system. This concrete runway is lastingly protected against expansion and contraction strains by Carey Elastite Expansion Joint, dividing the concrete into twenty-foot squares.

For Aviation field service:

Carey Asbestos Corrugated Roofing and Sheathing, Carey Elastite Asphalt Plank, Carey Elastite Asphalt Waterproofing, Carey Asbestos and Asphalt Built-up Roofing, Carey Asbestos and Magnesia Heat Insulations.

YES—a sandwich of asphalt and fibre compound, between sheets of asphalt-saturated felt. The famous Carey Elastite Expansion Joint! It protects the concrete against expansion and contraction strains—keeps the surface safely smooth.

In airports everywhere, this pioneer expansion joint is used wherever concrete is used. Protecting taxi strips and runways, pavements and hangar floors—adding extra years of service to the life of the concrete. An economical airport property improvement, quickly and easily installed. Write for particulars on Expansion Joint installation.

Philip Carey Products

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Keeping an Eagle Eye on ELECTRIC and GAS SERVICE

Serving 313 communities in 6000 square miles of territory, the Public Service Company of Northern Illinois uses a Sikorsky Amphibion to add speed and efficiency to the administration of its properties

How the Maywood, Ill, Gas Holder looks from the comfortable cabin of the "Northern Light" Note the direction marker on top This valuable guide to pilots is illuminated after dark and is visible from an altitude of more than a mile

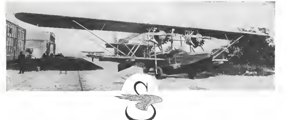
QUICK to make use of every scientific development which can give added speed and finesse to its operation, the Public Service Company of Northern Illinois long ago saw major advantages in the use of aircraft After a careful study of existing types, they purchased a ship exceedingly well suited to their particular requirements ... a Sikorsky Amphibion.

This "S-38," appropriately christened the "*Northern Light*," serves its Company . . . and the Company's hundreds of thousands of customers ... in making surveys of proposed electric transmission lines, power development sites, gas mains and coal lands Further, the ship forms a tremendously important means of quick transportation for officials, men, apparatus and tools to points of emergency In many cases the plane is landed on water, just a step from the Company's stations.

Like all her sister Sikorsky Amphibions, the "*Northern Light*" is equally at home on open water or fields Her landing gear is easily convertible for use ashore or afloat in a matter of seconds. With two 420 H P. Wasp engines she has a cruising speed of 110 miles per hour and she can fly and maneuver on either engine

Here is a ship of remarkable reserve power, luxurious comfort and complete adaptability to landing conditions. Sikorsky Amphibions are proving splendid investments for public utilities, transport operators, business firms and individuals The reasons for this are interesting. Some of them are contained in a recently issued booklet May we send you a copy?

Sikorsky Aviation Corporation, Bridgeport, Connecticut Division of United Aircraft & Transport Corporation.



SIKORSKY AMPHIBION

Mobiloil in another record flight!

Nyrba Lines establish fast South American mail service

The New York, Rio & Buenos Aires Line, (Nyrba) recently set a new airmail record of 7 days flying between Miami and Buenos Aires The fastest steamer mail between these points takes 18 days.

Not only in this record flight but in its newly inaugurated airmail, passenger and express service between Miami and important South American capitals, all Nyrba planes are lubricated with Mobiloil Aero Oils

The "double-range" features of Mobiloil Aero Oils—easy starting and prompt oil distribution at low temperatures—full body and efficient lubrication at high speeds—make them the choice of the world's leading air lines.

Mobiloil Aero Oils are on sale at all established airports.

VACUUM OIL COMPANY

Makers of high quality lubricants for all types of machinery

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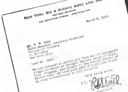
NEW YORK, RIO & BUENOS AIRES LINE, INC.
March 6, 1930
Mr. R W Lake
Sales Manager, Aviation Division
Vacuum Oil Company
61 Broadway
New York City
Dear Mr Lake
Very truly yours
President

For Rocker-Arm Lubrication Use Mobilgrease

AVIATION

THE OLDEST AMERICAN AERONAUTICAL MAGAZINE

A McGRAW-HILL PUBLICATION . . . ESTABLISHED 1916

EDWARD P. WARNER, *Editor*

VOLUME 28 . . . ***June 28, 1930*** . . . NUMBER 26

Covering the News

ON JULY 12th, the first issue of AVIATION's new weekly news service will appear Upon that date, and each Saturday thenceforward, there will be presented between separate covers the material for which our readers have been accustomed to look in back of the book, trailing the feature articles The current news of the industry, of governmental affairs in their aeronautical aspects, and of notable flights and engineering developments is too important to trail anything else It is too important to be given in any but the handiest and most compact form, easy to find and easy to read. We are giving its standing deserved recognition

The newspaper, be it daily or weekly, general or specialized, is read and thrown aside—or sometimes preserved for possible needs of future reference It is read, useful knowledge or entertainment is gained in varying amounts, the effect is pleasurable or not as the case may be, but rarely does the reader stop to figure out just what is being set before him or from what sources What precisely, is a newspaper's or news service's task?

Generations of newspaper men, back even before the days of Bennett and Pulitzer, have sped forward in the wake of a shining gonfalon inscribed "Get the news; all the news" Another and a more exclusively modern group takes as their preceptor Mr Pickwick's Fat Boy, and wants to make yer flesh creep Another, with Andy Gump and Mr Jiggs as their standard bearers, are quite content to amuse Cachinnation rather than cogitation is the measure of their attainment in their own eyes

Getting the news still offers a problem worthy of a reporter's best talents, and unsuspected sources may be tapped occasionally, but merely filling the columns of a paper presents no problem at all The difficulty is not so much to acquire news as to reject it It has not only to be got, but also to be sifted A great amount of news gets itself The recognition of the publicity man as a necessary and a conspicuous member of the staff of every organization has released a flood of material upon the editor's desk To discriminate between what is of real significance and what is of none, between the proper content of the news columns and material that belongs rather among the advertising, is not a task to be undertaken lightly It calls at once for all the shrewdness that the editor possesses for all the knowledge of past events that he can summon to his aid, and for a constant forecasting of the future by way of telling which of today's items is most important in the effect that it will have upon tomorrow The success of a reporting service such as we furnish, and shall shortly be offering in improved form, is not recorded by the number or variety of items printed but by the success with which they tie the past, present, and future together into a logical stream of events Members of the journalistic craft sometimes cynically remark that there is nothing so dead as today's newspaper, but it is the root from which tomorrow's or next week's will grow

Any proper presentation of news carries with it the responsibility of interpretation and explanation Undigested material is simply confusing in proportion to its mass The average reader has too many troubles of his own to remember, or spontaneously to appreciate, the background of the item that stares up at him from the page We are making it our business to tell him not only what is happening, but what it means It is as unfair to expect him to recall all the pertinent industrial history as to demand that he depend on his own recollection for the identity of the XJ2-R3, should those cryptic symbols appear in the week's reports All that collateral information, we aim to furnish That's what an editorial staff is for.

One thing more you are entitled to expect when you buy a newspaper Appropriate abstracting and indexing

are essentials of a proper service. We make it a practice now to pick out the conspicuous occurrences of each week and group them together to permit a three-minute survey of the aeronautical world. We shall continue that practice, but it will be supplemented and extended by other schemes of summary and classification. The headline reader has been subjected to a great deal of unmerited scorn. The busy man reads headlines for want of anything better because he has no time to swim through an ocean of verbiage, but no man is so busy as not to want at his disposal the unabridged account of those matters that most deeply interest him. To be at once concise and complete is difficult, but at least the concise form can index the complete one. We are aiming especially to render service to the man who wants to get the week's story between telephone calls, but who finds also that there are two or three chapters in that story of which he must have every detail.

//

Promoting Aviation,—How Not To Do It

EVERYONE connected with aeronautics now agrees that intensive consumption of alcohol is a poor recommendation for a commercial pilot. Everyone agrees that the aroma of Gordon and Scotch is a poor bait with which to catch business men as passengers for air transport lines. There is nearly, if not quite a universal consensus among those actively engaged in aeronautical work and dependent upon the growth of the airplane's popularity for their livelihood, that it is not only a bad thing to drink too much but a bad thing to spend much time in talking about the subject.

We have touched upon this subject from time to time in the past, always in general terms. Now we are going to be specific, and call a few names.

There has reached this office an announcement of an aviation meet at Allentown, Pa., to dedicate a new airport. It bears the heading of the Herbert Paul Lentz Post No. 29 of the American Legion. It proclaims that "a 'Pilot's Party' is planned that might get real old-fashioned. Who knows?" and further, in the most conspicuous location on the sheet, that "According to Floyd Gibbons, the Literary Digest poll shows Allentown is

1,059 for enforcement
2,563 for modification
5,001 for repeal!"

Emphasis is supplied, beyond the range of our editorial pages to reproduce, by printing the first of the three lines in the most diminutive of types, the last in screaming letters a quarter of an inch high.

At the top of the page, we note with interest, stands the motto, "For God and Country." At the bottom, "All contracts and agreements, to be legal, must be signed by the Post Commander and Adjutant." This particular pronunciamento carries the name only of the chairman of the contest committee of the meet, so the implied promise conveyed by the forewarning of the 'Pilot's Party" cannot be considered legally binding.

If the sponsors of that document want to lay their plans to have a good time among themselves in any way that most appeals to them, we have no comment to offer. If they care to broadcast the news of it to the world, that's up to them. It's a free country. So far as we know, no one has any control over their plans and their advertising unless the national officers of the Legion, who have always shown themselves sympathetic to a sensible development of civil aviation and anxious to assist it, might care to try to exercise a little. But if the officers of the Herbert Paul Lentz Post (assuming the announcement to be genuine), or of any other group, think that this is the way to promote flying, or that they are rendering any service to aeronautics with a meet so publicized, we can very positively inform them that they are mistaken.

Builders and operators of aircraft have enough natural and inevitable difficulties to contend with at the present time without having their supposed, but certainly badly misguided, friends laboring to set up new obstructions of unfavorable public opinion in their path.

//

Aviation's Indirect Service to Industry

ONE OF the salient points in aeronautical development, often commented upon, is the co-operation extended aviation by industries whose fundamental interests are far from aeronautical. Much of our technical progress has been due to alien industries which concentrated their specialized resources on the development of specialized materials and parts for aeronautical application, and in so doing increased the strength—weight ratio of their products. Those who have participated have helped along their own fortunes, for the aircraft business obtained, significant though it has been itself, has been but a small measure of the total reward for their effort. Almost invariably they have been able profitably to apply the progress made, and the technical lessons learned, to the far greater volume of the basic markets for their products.

More and more, all industry that is concerned with moving parts is appreciating the significance of moving a minimum weight. Mere mass is at a distinct disadvantage. Every pound moved, whether it is traveling on wings or shuttling to and fro in a mechanism, contributes to cost. The unit costs of carrying weight are higher in aircraft than elsewhere, but the principle is universal.

If the same strength in a material can be attained with a lesser weight, or a given function performed with a lesser weight due to a better load distribution, the gain is self-evident, no matter what the industry. Many of the high-strength steels and light alloys used in general industry, and many of the weight-saving principles of stress analysis applied, owe their origin to aviation.

There are nevertheless, here and there, material producers or parts makers, who do not see the value of development for aeronautical use. They feel that at present if aviation wishes to utilize their products,—"well—there they are, and how many will you have, please?" If, or when, aviation can guarantee quantities such as they are accustomed to in older industries, they will be glad to consider the production of modified materials or specialized parts. They are a minority. We believe them mistaken in their attitude.

Entirely apart from any aviation volume at present available, they are overlooking the advantage to themselves of securing the active co-operation of the world's most highly skilled experts in weight reduction. They can virtually add to their research staff, by the mere acts of co-operation, men who have attained the front rank of technical achievement in strength—weight ratio design. The advice that they get, and the experience that they gain on aircraft will help them enormously in developing materials or designing parts for greater strength at less weight. To all such we extend a cordial invitation to interest themselves actively in the aviation field, to the mutual advantage of aviation and their own present business, whatever it may be.

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Advertising Safety

THE OBJECT of good advertising is not primarily to hynotize the reader. It certainly is not to delude. The first need is that attention should be attracted, but when spectacular display and striking slogan do their utmost to insure that the eye will be caught something specific must be said. Some information must be given. The advertisement of an airplane must be something more than a mere declaration that such a machine exists. It ought to contain a concrete assertion, if possible with detailed evidence, of at least a few specific virtues.

There are many points upon which the builder of an airplane may feel that he has occasion to boast of its qualities, and most of them find their way into the advertising pages. Examination of a few recent copies of AVIATION gives evidence that manufacturers, or their advertising agencies, are quick to seize on citations of economy in operation or simplicity of maintenance. They are in no wise backward about allowing their performance figures to become known. They are diligent in compiling and reciting statistics upon the number of machines of their own manufacture, as compared with those of their rivals, that are in regular service. If they can show a price advantage, they manifest no undue diffidence about mentioning it.

One subject, and only one, seems to be virtually overlooked, or actually taboo,—safety.

It is sometimes mentioned in the abstract. A plane may be "the safest in the world." It may be credited with specific features contributing to safety, although even that is comparatively rare. Almost never,—we have encountered but two major exceptions over the last few months,—is there any attempt at proving just how safe the craft can be. Airplanes vary in inherent safety as in their other qualities. Some types have records far superior to the general average,—records of which their sponsors have every right to be proud. So have some air transport lines. Why don't they celebrate the fact?

The explanation must come down from the bad old days when no one talked about safety at all, and when to mention the subject in any general gathering was a sort of treason to aviation. The effect upon the intelligent layman as a potential air traveler was of course to convince him that behind so extraordinary a conspiracy of silence there lay some very ugly secrets, and that we did not mention safety because we did not dare to have the truth known.

The counter-argument has been that if we did not talk in too much detail about safety the traveling citizenry would also eliminate the topic from their minds. That doctrine was espoused by some of our most distinguished operators, but we have always believed it essentially unsound. It is with gratification that we have seen the subject of safety become an open one, its importance freely recognized, thanks largely to the initiative taken and the frankness displayed by such leaders as Reed Chambers and Paul Henderson.

But now there is another step, not merely to talk safety among ourselves but to advertise it to the public and in the most specific terms. Automobiles have been advertised with safety as their pre-eminent selling point. Railroads with splendid operating histories have proudly proclaimed their safety record to the public. It is time that the aviation industry followed suit on a grand scale, not merely in a few sporadic instances.

There are airplanes which have never had a structural failure. Why not proclaim the fact? There are others which have never had a fatality resulting from an involuntary spin. Why not say so? There are air lines which have never had a serious accident. Why not let the public in on the secret? It is not a pleasant thing to talk about accidents even for the purpose of emphasizing their absence, but the potential purchaser will think about them in spite of all we can do. It is better to reassure him specifically than to pretend that he cannot feel any uneasiness.

THIS MATTER OF SALESMANSHIP AND THE *Truth*

By Robert M. Burtt

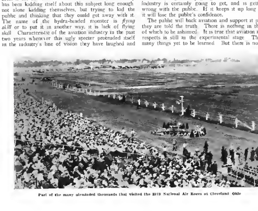
There is nothing that will cause the customer to shy away quicker than an unconvincing misrepresentation of the merits of a product. For some reason many salesmen in the aircraft industry consider the average plane prospect to be deaf, dumb and blind, particularly dumb. And being that way, he will swallow every bit of the salesman's patter. ¶In this article Mr. Burtt deals with such a situation and points out in a most interesting way how it is hindering sales today, and if allowed to continue will practically eliminate the private plane market

WHY do people not buy planes and fly themselves? Or if they do not care to learn to fly, why do they not purchase a plane and hire a pilot? Various reasons have been advanced as to why they have not. Lack of service facilities at airports, inadequate number of flying fields, general ignorance about flying and its advantages among the public at large. Some hold out that the general public is in a state of apathy regarding flying. It is said they are interested in aviation as news or in an impersonal way, but do not accept it for themselves personally. Some claim the reason is poor salesmanship in selling planes and flying courses that the cost of aircraft and learning to fly must come down. Many other reasons have been advanced as an explanation. A thorough investigation by the author convinces him that the real reason is none of these enumerated. They are contributing factors, it is true, but none of them is the fundamental reason. The aviation industry has been kidding itself about this subject long enough not alone kidding themselves, but trying to kid the public and thinking that they could get away with it. The name of the hydra-headed monster is *flying skill* or to put it in another way, it is lack of flying skill. Characteristic of the aviation industry in the past two years whenever this ugly specter protruded itself in the industry's line of vision they have laughed and said, "out of my sight, you, we have too many other things to think about now. We'll take care of you later."

The time has come when the very life blood of the industry is dependent upon their no longer ignoring unsavory conditions or obstacles. Instead of sitting around among themselves congratulating each other on having gotten in on the ground floor of a marvelous industry, they are going to have to sit down many long weary hours, face their handicaps honestly without over looking a single one, understand what they have to contend with, and then struggle for solutions. If they do not do this there won't be any industry of which to be so proud.

MOST aircraft salesmen tell people that flying is just as easy as driving a car. "The thing's a cinch—just like rolling off a log." Such claims are entirely wrong and misleading, and by going out with such stories the industry is certainly going to get, and is getting, in wrong with the public. If it keeps it up long enough it will lose the public's confidence.

The public will back aviation and support it provided they are told the truth. There is nothing in the truth of which to be ashamed. It is true that aviation in many respects is still in the experimental stage. There are many things yet to be learned. But there is no reason whatsoever why the public should not be completely taken into the industry's confidence in all things pertaining to flying.



Part of the many airminded thousands that visited the 1929 National Air Races at Cleveland Ohio

If what you say regarding the amount of flying skill necessary is true how much does it take, you ask? Very well, suppose we do a little investigating. The easiest licensing to obtain, the one which requires the least amount of skill, is the Private Pilot's License. Before starting flying a physical examination must be passed which, though not very severe could not be passed by everyone. It stresses absence of organic disease fairly good vision and normal judgment of distance. The applicant must have had 10 hours of solo flying although if he is a graduate of an approved civilian school part of his dual instruction time may be credited as part of the 10 hours. Then a flight test must be taken which includes a series of five gentle and three steep figure eight turns from 800 to 1,000 ft. respectively. A spiral in one direction from 2,000 ft. with engine throttled and land in normal landing attitude by wheels touching ground in front of and within 500 ft. of a line designated by an examiner for the Department of Commerce. In addition three satisfactory landings must be made before the Inspector. The applicant for the private license must also pass a written examination on the air traffic rules and those portions of the air commerce regulations pertaining to pilot's privileges and limitations and to the inspection and operation of aircraft. Most reputable schools charge between $500 and $600 for the course leading to the Private License. Average students will find that by the time they take the examination they will have had a total of around 25 hours in the air. The length of time required to complete such a course and take all the examinations will vary depending upon the ability of the student, general weather conditions and the particular season of the year. It can be done in good weather in a month, provided the student can devote a very large amount of time to it.

HOW MUCH skill does it take to drive an automobile? It would be a waste of good ink to dilate on this subject. Every reader knows how much time it takes to learn to drive a car. Some people pick it up in a few minutes, others may take several hours. As for expense—there is none. If anyone wishes to purchase a car and does not know how to drive one there is no question in the author's mind but that the prospective purchaser will find a motor car agent who will be glad to teach him how to drive in order to make the sale.

After a private license is obtained and the ability to fly has been acquired, a beginning only has been made. In order for the pilot to be safe in his handling of a plane he or she must fly regularly. How much, you ask? Opinions differ on this subject but after asking such men as Department of Commerce inspectors, Army Air Corps officers, pilots of transport planes and a few private pilots an average of all of these opinions would be about two hours a week in which would be included five landings and one emergency landing without the use of the engine simulating the conditions of a forced landing. In other words this is the average opinion of what it takes for a pilot to keep in flying shape.

Old experienced pilots recognize the necessity of doing this. They realize that they must be prepared and in practice to take care of the emergency situation that is bound to crop up every so often in air navigation. Such a situation being usually due to either engine failure or bad weather conditions. Not long ago the author asked the following question of the operations manager of a large air transportation line, who has a large number of experienced pilots working under him. "How many of your pilots would be able, from an altitude of 1,000 ft., flying over average country, to land his plane without injury whatsoever to the plane, in case of a complete engine failure?"

He thought for a few minutes and then replied.

"This subject has troubled me considerably. My pilots do not get enough practice in forced landings. We have good engines, carefully cared for and such occurrences have been almost unknown with us. However, I am requiring my pilots to take a plane up over the field at least once a week at approximately that altitude and simulate such a condition. In answer to your question I would say, at the present time, that probably about 75 per cent of my pilots would be able to fulfill the condition you outlined. Nobody would get hurt probably but in a fourth of the cases probably minor damage would be done to the plane."

Bear in mind, these men are all experienced transport pilots, the best in the business. If they cannot be relied upon 100 per cent to get a plane down without damage in forced landings occurring from such an altitude what can be expected of private pilots?

Whether or not the owner of an airplane, flying it himself, could get it down all right under such circum-

stances depends again to a great extent on the type of plane he is flying There is a vast difference, as everyone knows, between the performances of some of the commercial planes offered to the public at the present time It is ridiculous to compare an open cockpit training type plane with a very slow landing speed and an ultra-speedy cabin job capable of a high speed of over 150 m.p.h. and landing around 75 m.p.h. Anyone can picture to themselves the vast difference in degree of skill required in handling two such opposed types in a forced landing

In order to investigate this subject more thoroughly the author interviewed a number of ex-plane owners. At some time they had purchased a plane but did not own it now. In some cases where they had acquired licenses these had been allowed to lapse You purchased a plane at one time and flew it, I asked? Why do you not own it now? What made you part company with it? Was it because you could not obtain adequate service facilities? Was it because you had to leave it out in the open? Or was it too expensive to keep up? Perhaps you finally got tired of flying? The answers were various That is to say they were all phrased differently but in essence they were the same One man said

"No, it is none of those reasons I was flying cross-country one day and got into a bad storm I tried to land in various fields but the wind and weather conditions were so bad that although I tried I gave it up because I did not believe I could get the plane down without cracking up I thereupon flew as far away from the storm as I could and landed I just came to the conclusion that there was something lacking in me or it took too much skill to handle a plane so I sold it"

ANOTHER SAID "I flew regularly for a while but although I had done very well at flying school, when I had my engine quit one day I finally succeeded in getting down into a field, only after nosing over, breaking a prop and two wing panels. It was not the expense I minded but I did feel that inasmuch as flying was not my business and I did not have enough time to do very much of it I could not keep my skill in handling a plane polished up to the necessary degree to be sure of myself in such a situation It is true engines are getting more reliable all the time but they are not infallible and sometime or other such an occurrence will take place and I doubted my ability to be able to put the plane down safely every time such a thing happened"

And so it went on They all had different stories to tell but there was only one conclusion to draw These men were at least the average, if not a little above the average, of potential private pilots They felt from personal experience that there was too much skill involved Well what's going to happen you ask—is flying after all just for the favorite few? For only those who devote their lifetime to it and make it their profession? Won't the average citizen fly? Certainly they will, but let's face the situation squarely There are many things that will help Adequate airports in great numbers, conveniently placed so that they will be readily accessible to the cross-country voyager There will have to be more airports in or near the larger cities They will have to be more conveniently placed and more easily accessible The private pilot will not do much flying from the large municipal airports or air transportation terminals We are certainly facing the time in the near future when Department of Commerce regulations will prohibit it They will be forced to by the howls of air passenger and mail lines and it will be right It is ridiculous to endanger the lives of air passenger and air mail pilots by having the skies around such airports crowded by unskilled pilots.

IN PRESENTING their story to the public concerning the slight degree of skill required to fly, many salesmen leave behind them the impression that they are deliberately insincere or are, themselves, misinformed Either that or they have given no serious thought to the subject merely repeating parrot-fashion, some glib sales story learned by heart Any intelligent thinking man punctures their little balloon immediately These faulty-reasoning salesmen base their story on speed, and speed alone They will tell you that our ancestors were hard to convince that the automobile, traveling at the dangerous rate of 20 to 30 m.p.h was safe. They were hard to convince, they will tell you, because, our ancestors had been used to the horse-drawn vehicle, which traveled at the safe speed of 4 or 5 m.p.h They declare that the present generation, which has come to accept automobile speeds of 40 and 50 m.p.h are safe, are tough to convince that airplane speeds of 100 to 120 m.p.h are safe However, they will be able to do it, they say, just as it was accomplished in the case of the previous transition. These arguments would be perfectly sound were it true that the airplane traveled in the same plane as do horse-drawn and motor vehicles. Unfortunately, this is not true There are some radical differences of which the thinking man is well aware. The first two classes of vehicles go forward, backward, to the left or right, in the same plane The flying machine, on the contrary, goes forward, to either side, up or down, and, curiously enough it cannot go backwards under its own power It operates, then, in three dimensions, whereas the former two only operate in two dimensions Don't let these gentlemen kid you that this doesn't make SOME difference Another factor of extreme importance. In the case of the horse-drawn and motor vehicles extremely high speeds are dangerous On the contrary, speed to an airplane means safety. The faster the air passes over the controlling surfaces the more control the operator has over his plane In lack of speed only is there danger Don't think for a minute that this second fundamental difference is easy for people to grasp. They may comprehend it theoretically but it takes time and experience to put it into practice In the matter of these basic dissimilarities let's have done with hokum and tell the truth

At a recent aircraft show, while wandering around the floor, I became interested in a sales talk that was being made in one of the booths I hovered around in the offing pretending to look at the plane but avidly drinking in what the salesman was saying He showed the prospect all over the plane, told what it would do and I must confess that after listening to his presentation the only way that I could visualize the plane he was talking about was to close my eyes, imagine the high speed performance of an army pursuit plane, the carrying capacity of a trimotor and the landing speed of a glider Then when I opened my eyes and looked at the plane he was talking about the reaction was pitiful

The salesman was making a desperate effort to close the deal Finally he said "If you will buy this plane and give me a deposit today I'll throw in a $500 flying course free You can come on down to the factory, learn on our own field and in two days you will be flying the job back home."

The prospect made a kind of a joking reply, saying that there must be a lot of profit in airplanes or they could not afford to do that He was wrong in both thoughts There was not any profit in the plane and they certainly could not afford to teach him to fly free, that is if they did a thorough job The prospect asked how much time it would take for him to learn The salesman replied that he would have him flying in five hours and then he would be able to fly by himself

"Do you mean to say that I can learn to fly in five hours take delivery of the plane and it will be perfectly safe for me to fly the plane back home and take my friends up? If that is so the rate for flying instruction is higher than I thought About a $100 an hour."

THE SALESMAN weakened a little bit at this and said that it would be a good thing for him to practice a bit before he started back home I could see readily enough that the prospect did not believe the salesman He was unconvinced There is no question in my mind but that such misleading information about airplanes and flying is doing an immense amount of harm to the industry at large I have heard intelligent business men say that they believe aviation is just a gigantic promotion scheme When you hear such rot as I have just repeated, in all sincerity, can they be blamed?

Interested to see what this particular prospect would do I followed him when he left this particular exhibit If I had been in his shoes I believe that I would have left the building and forgotten all about airplanes and flying, but besides being a glutton for punishment he was honestly interested in acquiring some information. He finally wandered to another plane and while examining it was taken in hand by another salesman This sales representative presented to him the honest facts regarding the line of planes he was selling He did not exaggerate their performance. He gave him an unusually concise and clear recital of figures having to do with the operations costs of his line of planes He stressed the all-around efficiency of his planes They were not so high speed as to cut into their slow landing qualities and their carrying capacity had not been stretched to a point that would interfere with safe maneuverability at all times He told the man frankly that he could not expect to have the maximum of every desirable quality all rolled into one. It was physically impossible. In answer to the prospect's question about learning to fly he replied

"I presume you drive a car Well, flying is much more difficult than that However, if you have good eye sight, a good heart and your physical reflexes are normal you can learn to fly. It will be perfectly safe, after having gone through a sufficient course, for you to fly any of our planes where it might not be in a plane of ultra-high performance. We have tried to build into our line of merchandise qualities which will fit the ability of the average person who might learn to fly. We do not teach flying ourselves, however, we can recommend a good school where you can get a course leading to a private pilots license for $350. Even after you get your license you should practice a lot under proper supervision and keep in shape by flying constantly."

This salesman I could see, made a thorough good impression. He treated his prospect as an intelligent business man and did not try to blind him with a bunch of outlandish bunkum If this prospect bought anything I am willing to wager that he at least came back and talked to this salesman who, I am sure, had won his confidence as he had mine. And I, let me add, was much more critical than the prospect How much better off the aviation industry will be when they have this type of personnel presenting its story to the public

Future airplane prospects and air travelers inspecting three W.A.E. Fokker transports

PROBLEMS OF THE *Airport Manager*

A Short Discourse on Some of the Conditions He Must Face, and the Way He Should Fill His Job

By G. M. Turner
Field Superintendent
Oakland (Calif.) Municipal Airport

PERHAPS the most pleasant feeling experienced by an airport manager in his otherwise crowded day comes when he greets and is greeted by fliers and flying people as they set down on his field. He must care for their needs and comfort, see that their planes are adequately serviced and perform a multitude of other tasks attendant to air travel. But it's all in the day's work. Service is all that any airport has to sell and service is what counts.

I would say that personality, congeniality and courtesy are the three primary requisites of an airport manager—without, of course, overlooking the important factor of ability and dependability. The crab, the egotist and the shiftless have no place on the flying field. Smile with them and work with them—and they'll all come back again. That, at least, is our motto at Oakland Municipal Airport, and we feel that we have earned a degree of success following it out.

To become an efficient airport manager, one has to combine executive capacity along with optimism and sometimes courage. He must particularly be a demon for discipline, for without discipline at an airport lives, property and morale are jeopardized. As in a military organization, there has to be respect for authority. I do not mean to say that civil airports should be conducted under military rule, but I do say that airport managers must be clothed by their states and municipalities with sufficient authority, under reasonable rules and regulations, to get quick and efficient action without question.

In many instances, those in authority at airports are not delegated sufficient authority to act in enforcing field rules and regulations. If he must be a martinet under certain conditions, then the airport manager should be backed to the utmost by fullest authority, that is, of course, if the authorities have confidence in his knowledge, experience and judgment. If they haven't they should get rid of him quickly.

In employing an airport staff, as in any other organization, men should be carefully selected for their capability and experience. They must be tested for their judgment, for they must meet many emergency problems requiring tact and skill. The airport staff must be sufficiently large to permit smooth and efficient operation in all departments. Too many mistakes are being made by too few employees. On the other hand, it is true also that too many employees mean cumbersome operations and a drain upon resources.

A reasonable rate should be charged those using an airport, and my experience is that the flat rate is most desirable. I would have no fee for landings, but there should be a reasonable rate for hangar storage. Other charges for commercial privileges will help pay for upkeep and perhaps bring a return on investment. Commercial privileges include schedule and hop flying, student instruction and aircraft demonstrations.

Much difficulty is being experienced at certain airports in the handling of individual operators, that is, the small plane operator. In his own organization, he may be the proud possessor of one, two or three planes and employ his own mechanics and pay ride solicitors, but to the airport manager he is probably only one of several that have to be treated alike. If the operators are competitors, their rivalry must be kept from getting so keen that their conduct and the conduct of their men shall be unbecoming and unethical. The airport manager is frequently called upon to settle disputes among them, and again he must exercise tact and fairness.

UNDOUBTEDLY the greatest difficulty an airport manager has to face is the fact that itinerant fliers just arriving are not schooled in the rules and regulations of his field. Many times they cause considerable traffic congestion. At the departures, at least, this congestion can be avoided by apprising the flier of the takeoff rules. It is wise also to give him the necessary information about landing, for he will probably come again.

Of course, the great trouble so far has been that there has been no standard set of rules for the obvious reason that each airport has conditions that are peculiar to itself. Nearly all airports have their own rules and regulations. A simple example is the case of the airport that requires left hand turns on takeoff and landing as against that which requires right hand turns. It would be well for a standard to be established, though it will be necessary to make it flexible enough to apply to the different conditions obtaining at different airports.

Still another problem is the providing of adequate hangar space. Most of the major airports are overcrowded, though many of them are fast constructing more and more hangars. One of the great hazards of crowded hangars is the difficulty of removing planes quickly in case of fire. More space and the proper placing of planes is the only solution.

THE TRANSPORTATION factor also cannot be overlooked by an airport manager, for upon the ease and dispatch with which a person may reach his field may depend the popularity and success of the field. He should make every effort to see that adequate transportation facilities to and from town are available. He will generally find the street car, bus and taxi people open to suggestions about service, and he will always find the local automobile association willing to work with him in solving the traffic problem on the road approaches.

I have mentioned standard rules and regulations in field flying operations. Too much emphasis cannot be placed on the need for some kind of standard. I have found that office standards are also desirable, that is, standards as applied to systems of accounting and record keeping. My experience has shown that at least 25 different forms are required for recording routine work. Trial and error have shown me many short cuts, and I will be glad to share my findings with any other airport managers.

Too much emphasis cannot be placed upon the necessity of keeping an airport free from political or "superior authority" interferences. Again it must be remembered that safety of lives and property are involved in proper management. Authority should be given only where it insures efficiency. That is almost too obvious to require mention, but many an airport is still struggling under such unnecessary handicaps.

An artist's conception of the Oakland Municipal Airport, Oakland, Calif.

Organized AIRCRAFT REPAIRING

A truss rib prepared for removal of front beam

By E. W. Beebe
Beebe Aircraft Service Muskegon Mich

A rib of sawed contours ready for the replacement of the upper camber unit

Some Interesting Tips on the Best Methods to be Employed in the Correct Repair of Damaged Aircraft

ORGANIZED aircraft repairing requires a prompt classification of work in order that each item for service may reach the proper department with a minimum of delay. Usually such matters may be attended to during dismantling or transportation.

Small repair depots may utilize a division of rebuilding into three major sections, to be subdivided as facilities are increased. These divisions are: Power unit section (including engine, engine controls, instruments and accessories tanks and lines). Wood structure section (including wings fairings coverings and rigging). Metal structure section (fuselage, landing gear, empennage, control system and fittings).

Time required for engine overhaul and repair, is controlled almost entirely by the capability of the man who does the work. Special tools and an orderly procedure in dismantling and assembly, with stock available are the controlling factors. In general it is advisable to remove engine and clean for ordinary top overhaul and repairs, because in the process important fuel connections, bolts and fittings come under the direct attention of the engine expert.

This may seem inconsistent with efficient service, yet there is a saving of time in the washing of tanks and lines, checking of fire extinguishing apparatus effected thereby. Further, an accurate knowledge of vital factors in the whole power system where precision is preferable to speedy replacement where there must be a choice. It is generally true that in the average plane damage, the engine is ready for replacement before the plane has been repaired. Hence the purpose here is to outline methods and special equipment to facilitate the work and the quality thereof, on damaged planes.

Wings usually absorb the major portion of repair time. Yet with proper equipment, one man may accurately rebuild a rather badly damaged panel in 10 hours.

Where it is necessary to replace a solid beam of rectangular cross-section, the entire covering must, of course be removed. A wide chisel, with a deep groove ground into the middle of the cutting edge, of sufficient width to accommodate the gusseted portions of cap strip will be of assistance in cutting the rib lacing. In some instances a slender blunt pointed double edged knife will answer as well in reducing the time required for this operation.

With the covering removed, all nails that attach portions of the rib to the damaged beam must be removed. This is usually done with "diagonal" cutting pliers. The bottom cap strip is released, from gussets immediately adjoining the beam by drawing nails and separating at the glued joint with a thin, sharpedged "palette" knife. A light tap with a mallet will usually release upright sections attached to the beam and a thin hack-saw blade run through to insure against unremoved nails, and to make clearance for passage of beam through the rib. Tension on truss units is next released, and all bolts through the beam completely removed, as well as fairing blocks, braces curved wing tip and brackets holding walkway or butt rib.

TO AVOID breaking ribs in removing beam, a "U" section strip slightly wider than beam thickness, and of proper length, with paired projections spaced as are the ribs, is required. A double "traction gear" attached to one end of this long jig, with screw adjustment to force the teeth into the side of the beam, will permit "cranking" the beam out, without damage to the ribs. The same jig is used in placing the new beam, but with "projecting fingers" on opposite side of rib and the gears free.

If solid spars are made up in the shop, which is usually less expensive to the plane owner, it is necessary that dimensions be precise in all respects, and drawings should be available. If they are not, a similar undamaged beam may be used as a jig, for boring of truss and other fitting holes. Beam material should be of select spruce, averaging from 10 to 16 grains to each inch, these grains laying as nearly parallel to upper and lower edges as possible. The ratio of annular (red) to summer pith (white) grains, should not be over 1 to 3, and at least 98 per cent of the grain at one end of the beam should be present at the other. Creamy colored spruce is preferable to red or brown, and Medullary ray should be present on the sides. Sap pockets, if tiny and not deep, and slight irregularities of grain are permissible, if these conditions do not come at points of maximum moment, or inflection points of the span. Season and wind checks render such material unfit for spars. Material of a white chalky color should be avoided in general, it is either unhealthy wood, or over kilned and brittle.

After a thorough examination of the new beam, it is worked through the ribs into position. Where compression ribs have been damaged, the first consideration is to replace them with properly dimensioned members. The next operation is the attachment of drag truss fittings and rigging for alignment and position. Certain panels have a small amount of "built in" sweep back which must be handled at this point. Next the ribs are properly spaced, and upright members glued and nailed to the beam, capstrip replaced and rib permanently assembled as before, checking leading or trailing edge at each rib. For beam alone, replacement time should not exceed three hours.

In ribs of the truss type, it is often more advisable to rebuild than to replace with new from a standpoint of reducing time in the work. Short members of a truss system rib, may be replaced by the removal of one gusset, or if the capstrip is to be replaced with new they may be applied before attaching the new strip. It must be borne in mind that the finished work should be identical with the original, and splicing of capstrips over beams, butt jointing, side lapping, reinforcing of damaged members by "doubling," while often found is not good practice. A damaged capstrip should be completely removed by means of the tiny tandem saw attachment for electric drill and replaced with a new one. Water soaking of slender strips, one hour per quarter inch cross-sectional area at the most abruptly bent portion will handle the average nose section. The tiny nails may be handled by means of a magnetic trip nailing machine, especially designed for this work. A severely damaged truss type rib may be rebuilt correctly in about 30 min.

NEW TRUSS RIBS are partially assembled for stock, without bottom cap strip, final assembly is accomplished on the panel, with contour jigs clamped to beams at a point adjoining the new rib. Ribs of solid material with lightening holes are in three sections, nose, interspar and trailing edge. They are attached solidly to spars, and a cap strip applied top and bottom. Repair of these ribs, if complete is usually a cumbersome unsightly affair, and it is preferable to replace the damaged sections with new. Cap strips are released and drag truss wires or tie rods disconnected for interspar replacement. Contour check by camber jig is in truss type ribs.

Ribs of sawed outline strips, routed capstrips and a built-up truss, must be examined carefully for grain separation at gusseted ends as these ribs depend upon solid material and carefully fitted and glued units for their weight strength ratio. Assembly of upper and lower camber units is possible in a simple notched jig with spacings to represent beams, in groups of from ten up. Final assembly of repair ribs is on the rigged beams, with partially assembled truss units, and precisely fitted beam gussets.

Trailing edge alignment or any built up rib is accomplished by releasing tip gusset, clamping a straight edge of light metal to butt rib and the reinforcing rib adjoining aileron and gluing and renailing the gusset. Ordinarily it is advisable to replace these gussets with new ones, as condensation moisture accumulates at this point while the plane is at rest, and in time the best material and nails will succumb, resulting in the additional drag of an irregular trailing edge.

Plywood web ribs must be examined for warping and glue separation. It is not advisable to attempt a reinforcement of such ribs, because in so doing, the glue is placed in tension, rather than shear and does not hold well. New sections will be preferable to the through bolt method which decreases the strength weight ratio and with proper equipment, the time required is but slightly in favor of the repair.

Metal ribs of the truss type should be brazed, if truss members become separated unless the construction involves rivets. In this case, reinforcing plates should be applied, as a sleeve, and re-riveted using the original punched holes where possible. Metal ribs formed from flat material may often respond to slight corrections of alignment, but a comparatively slight "buckle" renders them eligible for replacement. They are not expensive, and are quickly available as a rule.

Built up box spars require precise calculations, and the most careful workmanship. Unless correct blueprints and engineering data are available, repair of this type beam should not be attempted. Double lap splice of plywood webs and, "stepped" splice of compression flange not exceeding two feet inboard of wing tip may be safely handled, also reinforcement of torn "wing attachment bolt' hoith, by means of a tight fitting, alloy metal, box cap over damaged end, engaging with inboard drag truss fitting bolts.

Laminated wing tips are simple in construction, and do not require forms, or steambox. The thin strips are arranged for grain relation, fresh casein glue applied, and one end of the group clamped to either leading edge or aileron hinge support beam. It is then worked around by hand to the opposite side and clamped temporarily. Starting at the leading edge small clamps at short intervals around the curve are applied, the curve being shaped as these clamps are placed. Unless laminations are too thick the shaping should be accomplished with ease. As-

sembly should take less than 20 min and finishing a similar time

Covering time is reduced by the use of half and full length bags Wing tip repair usually requires but a single width of material, the fabric being joined over a rib, removing old tape and softening the exposed portion with thin dope, before applying new material New strip is then "doped on" and allowed to dry, upper and lower surfaces separately When the new material is permanently in position, it is riblaced in the regular manner starting at the rib upon which join is made, then one coat of dope, tape and finish Replacement of fabric and repairs may be done inboard with a little care, joining fabric on both edges in the manner above. Small patches on fabric should be finished with the same number of coats of dope as the panel, and should be cut in some neat shape, diamond, oval, shield or circle

MUCH of the speed and accuracy in plane rebuilding depends upon the orderly sequence of operations In wing work, there are certain fundamentals that are almost self evident It is obviously impossible to "rig" beams for alignment and position until the complete drag truss is in position And it is useless to attempt rib repair or replacement until beams are permanently adjusted Further, end ribs must be cared for first to permit proper alignment of leading and trailing edges.

In the metal section, undamaged bay cabane and interaileron struts may be used as jigs for duplicate members, where no permanent jig is available Thin hardwood blocks, with concavities on each side to accommodate the curved sides of streamline tubing, permit clamping the new sections to the old member, in proper position for welding and drilling of bolt holes Bolt hole reinforcements, usually tube bushings, wide washers, or internal clevis, are readily duplicated Where adjustment blocks are present, care in aligning threaded portion with longitudinal axes of the tube is essential to avoid eccentric loading, and vibration at that point

An accurate check of fuselage and engine mount alignment can be done without the dismantling of the structure A graduated gauge bar crosswise of fuselage, moving upon an overhead track provides the means. Long adjustable indicators dropping from the cross bar will give accurate measurements An upright between floor and overhead track, provided with "V" blocks into which the sternpost may be wedged is also necessary It is to be noted that certain planes correct engine torque by offset of the engine bed Slight variations of alignment may often be corrected by fairings Larger ones require judicious heating or replacement of damaged tubes in the usual manner of scarfed metal sleeves covering the ends of original and replaced tubes

Where a fuselage is seriously damaged, it is well to make a line sketch of the fuselage structure and cabane braces, and run an analysis of forces developed during the contact with the ground during the accident This is particularly true of cabin planes with rather a complicated truss system Often a critical load will be developed at a point distant from the most damaged portions that will cause an imperceptible crack, or buckling of tubing sidewall Such investigation will usually bring these items to light, and justify the slight effort required

Any dent, flattened or buckled streamline tube taking a compressive load in any flight attitude should be replaced with new material Building up dents with weld, sleeve reinforcement and inside blocking is not good practice, though often resorted to A diamond shaped reinforcement, whose width is not to exceed one-third the width of major axis of the streamline section, may safely be brazed over small dents, material being of the same thickness as the sidewall of tube However, it is advisable to avoid this where possible

Certain fuselage fittings may be straightened if not badly bent This is ordinarily done with the metal cold, as fittings are usually of alloy steel, and will withstand moderate bending without fiber distortion No set rule may be applied here, however Fittings of laminated metal require heating to a dark red on the side to be stretched in straightening Heat treated fittings, which can usually be recognized, or are indicated on the drawings, should be replaced with factory units, unless full engineering data and heat treating equipment is available, with an expert in charge

Landing gears may only be summarized here Damaged tubes, bent, dented, buckled or torn, invariably justify new members Welds should be examined for cracking paint which often indicates coming trouble Oleo-spring compression tubes may be replaced by sawing off upper fitting carefully, and cutting tube from around brazed points of valve which can then be removed These brazed points are smoothed down, and the valve inserted in a tube of correct length, sidewall, and precise overall dimensions to work freely within the lower member The valve must be accurately aligned in the upper tube, and the upper fitting is welded on as a cap

Certain types of gear have hardwood reinforcements within the tube, to increase the column strength To be of value these reinforcements must extend the complete length of tube. The process is to weld the end requiring longest heat, drive the reinforcing member into position, cut off accurately, and braze upper fitting in place

Wheel alignment requires releasing the weight from the gear by raising fuselage sufficiently, applying slow heat to portions of tube that will be stretched in straightening, and slowly pulling into position with bar through axle tube, aligning upon stabilizer for track, and using automobile wheel spacing jig for dish Occasionally it is advisable to slot a tube, and reinforce with a "through gusset" plate

Smooth work on engine cowling dents requires a leather or heavy cloth sack tightly filled with sand and a medium soft rubber mallet Cracks, or lost portions are covered with neatly shaped patches, using round head aluminum rivets closely spaced Beading and "breaking" are well understood, and done in the usual manner

IN ALL REBUILDING, the most desirable result is acquired by replacing damaged units, rather than temporarily repairing them The most critical scrutiny should be required to locate the repaired portions inside or out

A simple means of "triple check" begins with an orderly sequence of operations When finished, the man actually doing the work gives all items a preliminary check Secondary inspection is done by an assistant in training, with inspection card and with a small "time off bonus" for items found Final check is by both expert and assistant starting at opposite ends and passing

There are factors of use abuse and hidden weaknesses that must be brought to light during the course of the work Hence, swift accurate and inexpensive service must be based, not entirely upon efficient production methods, but largely upon special training and knowledge of the subject, the development of particularly adaptable equipment, of which some items have been outlined, and a critical turn of mind in those who actually do the work

USE OF *X-Rays* IN THE AERONAUTIC INDUSTRY

Professor Norton working with a typical radiograph set-up Relation of the tube and casting is shown

By JOHN T. NORTON
Assistant Professor of Physics, Massachusetts Institute of Technology

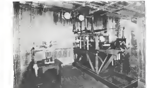
Most of the methods of testing materials available to aircraft manufacturers at present involve destruction of the part to be tested. This is not only expensive; it means that the parts which are actually used to build planes can be examined only superficially in most cases. Professor Norton, who has been supervising X-ray research at Massachusetts Institute of Technology for the past five years, summarizes the development of testing metal by X-ray up to the present time, and discusses in detail a number of actual and potential applications of the method in aeronautics

X-RAYS have been known for some thirty years and have been used with increasing success in the medical field, but it is only recently that technical and industrial applications have been developed to the point where they may be considered of practical importance Up to the present time the actual builders of aircraft have not employed X-ray methods to any extent, but the important field of application is in the materials and parts of which aircraft are made

Because of their extraordinary penetrating power X-rays enable us to study the interior of an object without taking or cutting it apart. This process is known as radiography, and has proved itself very useful Perhaps it is best described by considering an actual example Let us suppose an aluminum alloy casting which forms the crank case of an airplane engine has been made by a new process, and it is desired to examine its soundness It is sent to the X ray laboratory, where it is set up to be radiographed The X-ray tube is mounted on an adjustable stand and it is connected to the high voltage generator A voltage between 100 to 300 kilovolts is used depending upon the type of work The tube is set above the portion of the casting to be examined at a distance of about 30 in and immediately under this area is placed a piece of photographic film in a thin flat box which protects it from the light This film behaves the same way with X-rays as with visible light When the current is turned on the tube X-rays are produced which pass down through the casting through the cover of the film box or cassette and act on the film Any defects in the casting will cast shadows in the X ray beam and thus there outlines will appear on the film when developed These are very clear and show surprisingly sharp detail so that defects such as blowholes and inclusions of foreign material are immediately evident on the developed film Thick samples require a higher voltage on the X ray tube and a longer exposure than thin ones The maximum thickness which can be examined depends upon the material and at the present time the practical limits are aluminum, 8 inches, steel, 3½ inches and brass, 2½ inches In this thickness a defect whose size is about 2 per cent of the total thickness can be detected with considerable certainty In thinner sections the detail is much improved

There are several classes of materials to which

radiography can be usefully applied, and each has its own particular defects. Castings are probably the most important class from the point of view of X-rays. The greatest objection to their use in any structure is the question of possible unsoundness. Largely for this reason, they are used to a comparatively small extent in aircraft construction outside of the engine itself, but if one could be certain of the soundness of the metal, light alloy castings would find a great deal of use. X-rays have been very successful in examining these and in the development of casting methods which yield a high percentage of sound products. Three kinds of



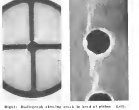
High voltage radiography laboratory. On the right is the high voltage generator consisting of a step up transformer and a mechanical synchronous rectifier. At the left is the X-ray tube on its adjustable stand. The room is lined with sheet lead for X-ray protection

defects are frequently found. Blow holes or inclusions of gas are common, particularly in the sand cast materials. These may take the form of a fine porosity such as is often found in sand cast aluminum or of bubbles which are seen frequently in steel castings and the size of these defects can be closely estimated. Inclusions of foreign materials are also common. In sand castings the sand or a part of the core may be carried by the molten metal to a place where it will materially reduce the strength. Chaplets, core supports, and portions of the core itself are often found remaining in the casting, particularly if it has complicated coring, and this condition is also clearly shown on a radiograph. Shrinkage areas and cracks are fairly common, particularly if improper casting methods are employed. Shrinkage areas due to faulty location of gates and risers are easily shown and have a fern-like appearance. Cracks, however, are much more difficult, for they involve so small a change in the thickness of the metal that unless the X-ray beam passes nearly parallel to the plane of the crack, it will not appear on the negative. Usually, however, a crack is of a winding nature, and some portion of it will be visible. Once its presence is suspected, pictures may be taken in several directions, and its extent determined.

With such methods of examination available, many applications at once present themselves. Because of the length of time and the relatively high cost, the routine examination of a large number of castings is not a practical procedure, but in aircraft work there are many instances of parts which cannot be allowed to fail in service. Here is a method which gives a complete and positive view of the interior and yet does not render it unfit for use. Compare it with the only other method of complete examination, which involves cutting up the casting and examining the sections, for it may not have been cut in the place which would have shown the most serious defect and the casting is ruined for actual use. Furthermore, with the X-ray method, the examination may often be carried out before machine work is done, thus saving considerable expense if it proves to be defective. The cost of such an examination, although it may even be comparable with that of the object examined, may be regarded in the light of an insurance against failure which in aircraft work is usually attended with most serious consequences.

There is another use for X-rays in the examination of castings which is no less important than the one just described. It is a method to be applied to foundry practice and consists of the examination of the pilot castings made by the different casting methods. There are numerous factors which have an effect upon the soundness, as for example, the temperature of the metal, the position of the gates and risers, the nature of the mold and the distance of the ladle to the top of the mold as well as many others. Also small changes of composition which do not appreciably alter the physical properties of the metal, sometimes have a great effect on the soundness of the resulting product. X-rays are excellent for examining the samples made by these different methods, for it is usually cheaper, quicker and more positive than sawing up the casting, which is the only other possibility. In this way it is possible to develop methods which will produce nearly one hundred per cent of sound castings. If one can depend upon soundness, the factor of safety or "uncertainty factor" in the design of the casting may be considerably reduced with the resulting saving of weight, and they would be much more widely used in aircraft construction than at present were this the case.

WELDING is used extensively in the building of modern aircraft, and here again we have an example of external appearance which is no indication of the interior. X-rays are used a great deal in this type of work, and have proved extremely valuable. Such defects as gas bubbles, inclusions of slag and oxide, lack of fusion between the surfaces, and cracks are detectable. Again we can ex-

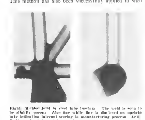


Right: Radiograph showing crack in head of piston. Left: Cracks in metal plate

amine the product without making it unfit for service.

Forgings and other wrought objects are seldom tested by this method because defects so seldom occur in this class of materials. However, blades of metal propellers for airplanes have been inspected successfully for cracks.

There has recently been placed on the market a small portable X-ray machine which could be used to advantage for the examination of comparatively transparent parts in the field. The tube and transformer are completely enclosed in a small box so that the danger of a high tension shock is absent and the unit may be operated from an ordinary lamp socket. For inspection purposes, it is possible to observe the X-ray picture directly by means of a fluoroscope, although this scheme does not give as fine detail as the photographic method. With such a device the inspection of an airplane could be made in much the same manner as that of a doctor looking for broken bones. Wooden wing spars and ribs could be given a careful examination without removing the fabric covering. In fact, practically all enclosed parts such as control wires and fittings, wheel brakes, shock absorbers, tail-skid supports and others could be inspected in place in a very simple yet positive manner. This method has also been successfully applied to such

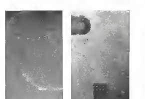


Right: Welded joint in steel tube fuselage. The weld is seen to be slightly porous. Also fine white line is disclosed on upright tube indicating internal scoring in manufacturing process. Left: Radiograph of forged duralumin connecting rod, showing sound metal and obscure defects

objects as electrical instruments with enclosed wiring, electrically heated flying suits and airplane tires.

The radiographic method of inspection has many useful qualities, but there are two important disadvantages which have limited its practical use to a considerable extent. One of these is the cost of the method and the other is complication and lack of portability of the equipment. In most cases it is necessary to bring the objects to the X-ray laboratory where the apparatus is permanently installed rather than send the apparatus to the place where the particular object is in use. These factors are being improved, and in the future this method should be very much more useful than at present.

There is another and entirely different use of X-rays which is also of considerable importance to the aeronautic industry. It applies to the study of the fundamental structure of metals and is essentially for the laboratory. A detailed explanation of the method is beyond the scope of this paper, but the physicist has developed it so that it is possible to study the arrangement of atoms in metal crystals and determine the sizes



Left: Junction of sand cast aluminum in engine crankcase from different gates with resulting weakness. Right: Sand cast aluminum in crankcase showing porosity and a perforated metal chaplet left in mold when metal was poured

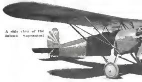
and orientations of the crystal grains in a metal product. This information tells much about the suitability of a material for a particular purpose. Some of the successful results of this method are of interest.

It has been found that the type of atomic arrangement in metals has an important bearing on their physical properties. Among the common metals there are three simple types, and X-ray methods furnish the only means of distinguishing them in a definite fashion. Pure metals, of course, are seldom used commercially, but this study of the real fundamental meaning of the properties which metals exhibit can be extended to alloys. Thus the properties of an alloy can be definitely predicted.

After a particular metal or alloy has been chosen for a special purpose, its properties can be greatly altered by mechanical or thermal treatment. Compare a piece of properly tempered tool steel with another piece which has been annealed, or a sample of hard drawn duralumin with an annealed sample. The X-ray method gives a more fundamental picture of these changes than the microscope or other metallurgical methods. A particular case is a cold working process such as the rolling of sheet metal. The microscope shows that the crystal grains are elongated in the direction of rolling. The X-ray method shows that these elongated grains are really made up of much smaller grains which are all oriented so that their crystal axes are parallel, thus giving the sample definite directional properties. Upon heating, this directional effect is difficult to entirely remove, although a complete recrystallization takes place, and this has an important bearing on the suitability for further operations such as cupping, spinning, etc.

THESE ARE only a few of the many problems of metallography which can be studied by this new method, and even though it is not one which the aircraft manufacturer will use to any great extent himself, it has an important bearing on the materials which he chooses for his construction. It is new and comparatively undeveloped, and has many disadvantages which prevent its more general use. But a great many people are working on its development, and rapid progress is being made so that it will eventually become one of our most important means of investigation, for its results are extremely fundamental and often not to be obtained in any other manner.

SOME RECENT DEVELOPMENTS IN *Light Airplanes*



A side view of the Inland Supersport

Inland Sport MONOPLANES

Two new planes, using the same chassis, are offered by the Inland Aviation Company. The first of these is powered with a LeBlond "60" engine. The second, a plane powered with a Warner "Scarab" Engine, is known as a "Supersport."

Both planes have the same general specifications. The span is 30 ft., the length 19 ft. and the height 7 ft. 7 in. The fuselage is made up of welded chrome molybdenum steel. The wings are the conventional type with double tie rods. The landing gear is of the split axle type, using a hydraulic shock unit. Some of the features of these planes are: large luggage compartments, demountable engine mounts and visible control mechanism. Both planes have the side by side dual control arrangement. The sport model weighs 768 lb. empty and carries a useful load of 530 lb. It has a cruising radius of 450 mi. The Supersport weighs 850 lb. empty with a useful load of 560 lb. It will cruise 525 mi.

The Supersport model comes equipped with a complete panel of engine and navigating instruments. It has navigation lights. Fittings are chrome plated, easily detached. Brakes are standard equipment on all models. A three way gasoline cock is located beneath the instrument panel, allowing the fuel supply to be taken from the main tanks individually or both at a time.

The designers have incorporated a novel window catch which permits the windows on the side to be open and held in any position while in flight. The catch also serves to lock the windows when not in use.

The landing gear is of the split type with oildraulic shock struts. The struts are fastened to the lower ailerons instead of the upper ones, as in the earlier models of the monocoupe. The wheels are the new product of the Aircraft Products Corporation, Detroit, and take the large balloon tire size 6.50x10.

Stabilizer adjustment is obtained by an arrangement of two springs each variable as to tension through a control under the pilot's seat. By adjusting the tension the pilots may trim the ship perfectly. Rudder and aileron are operated by steel cables. The elevator is controlled by a conventional push rod assembly. The entire fuselage is of steel construction covered with fabric. Two welded aluminum tanks, of 15 gal. capacity each, are built into the wing on either side of the fuselage. These tanks are fitted with direct reading gages.

The company offers the new Monocoupe in ten color combinations. Hamilton Standard steel propellers are standard equipment on all models.

THE *Monocoupe "90"*

The Monocoupe "90" is the newest 1930 offering of the Mono Aircraft, Inc. of Moline, Ill. This plane is powered with a Lambert R-266 engine, developing 90 hp. at 2,375 r.p.m. The Monocoupe powered with this engine has been given Department of Commerce Certificate No. 306.

While similar in general appearance, the Monocoupe "90", varies from its predecessor. In the new plane the power has been increased from 55 to 90 hp. The fuselage is 15 in. longer and 4 in. wider than heretofore. The seat cushions are leather, stuffed with Kapok and removable, permitting use of parachutes if desired. In back of the seat is a luggage compartment made of heavy canvas and removable for inspection purposes. The entire interior of the cabin is neatly trimmed. The passenger compartment is 4 in. wider and there are 6 in. more leg room than in the previous models.

An exhaust manifold cabin heater is built in and so arranged that it can be used for a ventilator in hot weather. Dual controls are standard equipment with those on the right hand side being

Model "90" Monocoupe

The Kinner powered "Gee Bee" biplane

The Mercury "Chic," adaptable for training or sport purposes

THE MERCURY *Chic*

Designed primarily for training work the Mercury Chic is adaptable to a wide variety of uses. It is definitely in the light plane class but has ample sized cockpits and full dual controls. Adjustable seats are provided with provision for the use of parachutes if desired.

One of the features of this plane is its all metal construction. The wing spars, landing gear, tail skid, and longerons are of chrome molybdenum steel tubing. All other structural parts are of 1025 government specification steel. The wings and fuselage are fabric covered. The fuselage is finished in maroon, the control surfaces in yellow, and the metal parts in black.

The landing gear is of the split axle type and uses standard 28 x 4 wheels.

The plane is furnished with a standard LeBlond "90" engine. It has a span of 35 ft. 8 in., a length of 23 ft., and a height of 8 ft. 7 in. The plane weighs 935 lb. empty, and carries a useful load of 578 lb. It has a range of 375 mi. with 28 gal. of gasoline.

While designed primarily for training purposes, the "Chic" is adaptable to use by the private owners. Its rugged construction allows hard usage with but few repairs. The instruments and general equipment of the plane are adequate for cross country flying.

"Gee Bee" SPORT OR TRAINING PLANE

The "Gee Bee," a two place, side by side, dual control biplane for sport or training purposes has been placed in production by the Granville Bros. Aircraft Company of Springfield, Mass. Aerodynamically, the Gee Bee is conventional. Structurally it is designed to meet the requirements of the Department of Commerce, and much care has been taken in its design to eliminate the peculiarities so often found in small machines. The plane combines maneuverability with stability and will fly "hands off" in level or turn flight. It assumes a normal gliding angle when the engine is throttled. All of the control surfaces on this plane are exceptionally large, giving quick response in maneuvers. The ailerons extend the entire length of the upper wing and center section, with the result that the loads on the stick are extremely light. Oversize elevator and rudder controls work through carefully fitted bronze bushed bearings.

The Gee Bee is equipped with Bendix brakes and a full swiveling pneumatic tail wheel. Application of the brakes is accomplished in a unique manner. The main brake lever—as shown in the sketch of controls—is located on the stick assembly and protrudes from beneath the instrument board in the form of a pistol grip. The brakes are applied by pulling this lever or by pulling the stick back in half landing position. With the brakes set, the distribution of braking force between the left and right wheels is automatically controlled by the rudder pedals, thus it is possible to land and stop with the hands and feet at all times on the stick and rudder pedals.

A radical departure from conventional practice is found in the control stick assembly. The sticks, main and dual, take the form of pistol grips on tubes extending horizontally backwards from beneath the instrument board. These sticks move fore and aft on brass rollers supported by a tubular slide. The elevator control is transmitted positively from stick to elevators through a lever and a push-pull tube. Aileron control is equally positive, passing from the stick slide to a short tube which extends directly upward to the center section where it is connected through horns and push-pull tubes to the ailerons. The use of horizontal sticks gives a perfectly clear cockpit and allows the use of robes or other such equipment while flying. The rudder pedals are hung from the top and are fitted with foot plates. The right hand controls—both stick and pedals—may be instantly released by the pilot. It is only necessary for him to turn the handle of his stick to release the dual stick which becomes completely detached from the assembly. A slight pressure on the pedal adjacent to the pilot's right rudder pedal is sufficient to cause the dual set to drop to their foremost position, inoperative. This not only protects the pilot in student instruction but also greatly facilitates the removal of duals for passenger carrying.

Two throttle levers are provided, one a hand lever with a large handle at the pilot's left, the other, a push-pull control in the center of the instrument panel. The latter may be made inoperative by a 90 degree turn of the handle and may be left stationary against the panel.

Two persons are comfortably accommodated in the cockpit which is appreciably widened by the use of wells

in the side upholstery These wells allow the elbows and upper arms of the pilot and passenger to pass through the fuselage side to the fabric covering thus utilizing the entire width of the plane

The landing gear consists of oil hydraulic struts fitted with rubber shock cord The hydraulic travel is seven inches The shock cord acts through the last two inches of this travel. The action of the hydraulic strut makes it practically impossible to bounce the plane in landing, while the shock cord gives very smooth taxiing qualities

All parts of the Gee Bee are so assembled that the effects of a crash will be localized to the greatest possible extent. This is accomplished by the use of universal joints in the landing gear, struts, and other parts that are liable to damage the primary structure if they collapse

The wings of the plane have 197 sq ft of area and are made up with a Clark Y section They have a 33 in overhang a 27 in stagger, a 52 in gap and a 45 in chord The fuselage is built up entirely of welded chrome molybdenum tubing and covered with fabric The plane is powered with a Kinner K5 engine The weight empty is given as 1,050 lb, with a disposable load of 600 lb, and a gross weight of 1,650 lb

Above Diagrammatic sketch of the "Gee Bee" control system

View showing aileron rods and interior of cockpit on the "Gee Bee"

The British three seater cabin Desoutter monoplane in flight

Desoutter CABIN MONOPLANE

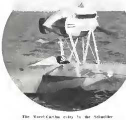
THE FIRST British cabin monoplane in the light plane class is the Desoutter three seater cabin monoplane and it has been promptly standardized by National Flying Services as their taxi and freight machine for general charter The machine is a high wing monoplane with a wide track undercarriage The engine is the new Cirrus Hermes four cylinder-in-line air cooled unit of 105-115 hp, a development from the well established Cirrus engine of 85-95 hp The plane has a British Certificate of Airworthiness for a gross weight of 1,800 lb the top speed is 110-114 m p h, and the cruising speed 96-98 m p h an exceedingly good speed for a three seater which, as had been said, almost comes into the light aeroplane class These figures are the result of official Air Ministry tests and they also include a climb to 4,000 ft in 6 min 1 sec The cruising speed is obtained at 1,900 r p m, and with a fuel capacity of 25 gal the normal range is just under four hours flying The weight empty is 1,070 lb leaving 730 lb available for disposable load and after providing for fuel oil pilot, etc. there is accommodation for two passengers, and a moderate amount of luggage The fuel tank is in the wing and arrangements are being made for the provision of an extra tank so that with less pay load a range up to five hours can be secured It is not necessary to enlarge upon the comfort of the passenger accommodation, which provides for two passengers on a broad back seat with a separate seat in front for the pilot who can converse with the passengers in flight quite easily It is of all wood construction except of course, for engine mountings and chassis, and is robustly built upon lines simple to produce and to maintain The wing is semi-cantilever and is covered with plywood while the spars are box type built of spruce laminations. The actual wing construction follows very much the Fokker type There is an air space in the wing between the fuel tank and the fuselage and all feed pipes are led outside the cabin There are sliding windows on each side of the cabin and a celluloid panel in the roof which lets in additional light and can be used as an emergency exit.

The under-carriage has a tread of 10 ft. 6 in, and is so designed that the landing force is taken on the vertical strut at the lower end of which is interposed a casing containing the usual system of rubber compression rings No landing loads, it is emphasized, can be transmitted to the spar as the whole weight of engine fuselage, passenger, etc is carried in tension by the diagonal flying struts which convey the load direct in compression to the vertical chassis legs the spar merely being in compression It is worth pointing out, too that the top of the fuselage is not directly attached to the wing but is only located there to prevent side movement so that the wing is therefore theoretically enabled to flex up and down in the centre the whole weight of the wing thus being carried from the four points underneath the wing to which the main flying struts are attached.

Racing Seaplanes . . . PRESENT AND FUTURE

The Second of a Series of Three Articles—Some Methods of Improving Performance

By JOHN S. KEAN
Project Engineer
Naval Aircraft Factory



The Navel-Curtiss entry in the Schneider Trophy Race of 1926

THERE are four recognized methods of increasing the high speed of any plane They are, increase in power, decrease in overall drag increase in landing speed and improvement in propeller efficiency For seaplanes, reduction of useful load and structural weight are also beneficial

The problem of increasing the high speed by increase of power has already been discussed The second method, that of decreasing the overall drag of the plane, appears to offer greater possibilities

An examination of modern racers indicates numerous features in which the drag of the fuselage may be reduced Fuselages are unsymmetrical, are broken in outline by fairings for struts, wing roots, engine cylinders and intake stacks Open cockpits, inadequately faired by windshields, are a particularly serious source of drag. Then, too, the wings are installed on the lower portion of the fuselage, immediately behind the propeller, and, thus, in a region of increased drag due to the increased speed of the slip stream Floats are expected to be nothing more They contribute but little to the lift in flight but are a particularly serious source of drag Any effort designed to reduce the drag of the floats or to so construct them that they contribute appreciably to the lift should be of particular advantage Methods of improving the various features mentioned above will be discussed hereafter

Tests have indicated that a fuselage symmetrical about the centerline has only about sixty per cent of the drag of the average fuselage of unsymmetrical cross section. It is apparent therefore, that while this figure of 40 per cent less drag is not to be expected in the full size plane, considerable improvement may be expected if reasonable efforts are made to attain symmetry.

It is true that the shape of the fuselage is largely determined by the shape of the engine so that improvement in the fuselage form may not be expected until engines are built within a fairly smooth outline This requirement especially favors the use of four banks of cylinders arranged in the form of an X, or a cross, or of an engine of circular or oval cross section with the propeller axis at approximately the center of area With any engine of this type a fuselage of approximately symmetrical section is not impossible

HAVING DECIDED upon the most desirable shape of the engine, the next effort should be directed toward reducing the cross sectional area of the engine There is one readily apparent way of doing this, namely, by raising the compression ratio to as high a figure as possible But there is a limit to the degree to which the compression ratio may be increased and this figure appears to have been reached in the case of the engines for the S-6 which have a compression ratio reported to be 10 to 1 In America the problems incidental to the use of these high compression ratios have not been solved. However, 10 to 1 appears at this time to be the high limit for this ratio Since progress is limited in this direction, the other normal means of increasing the power, that of increasing the displacement, remains But increased displacement normally requires larger cylinders and pistons with increased bore and stroke and generally increased overall size and weight Hence, with the normal four stroke cycle engine any attempt to reduce the size of the engine while increasing the power is blocked by limitations inherent in the Otto cycle type engine

However, there are other types of engines which have not as yet been adapted to airplanes but which seem to present interesting possibilities.

The first of these is the engine employing the Diesel cycle. The success of the Packard air cooled Diesel engine is well known to the aeronautical world. It would appear that for the same cross sectional area (or displacement) the Diesel engine could, by virtue of its higher compression ratio, be developed to provide considerably greater power than the Otto cycle engine and furthermore, the Diesel burning one of the heavier grades of oil rather than gasoline, is free from the normal fire hazards and has a much lower fuel consumption factor than the Otto cycle engine. It is also free from the ignition difficulties normally inherent in the standard type engine. Whether the Diesel can be developed in the four bank or circular form, mentioned before as ideal for racing plane and adopted for water or chemical cooling, remains to be seen but such development is of such nature as to seem a desirable contribution to the field of aeronautical power plants.

The second type of engine is the two stroke cycle engine. This is primarily a low speed engine compared to a four stroke cycle engine of the same power and displacement. Conversely for the same power and speed, it would seem possible to reduce the displacement and hence the overall size of the engine over that of the four stroke cycle engine. This reduction of overall size may also result in reduction of weight. It is realized that the two stroke cycle engine is not particularly efficient from the standpoint of fuel economy but it is felt that with proper design this disadvantage may be largely overcome. In any case the two cycle engine has promise of sufficient advantages for a racing plane at least, to warrant its further development.

Other changes in the conventional types of engine involve the use of chemical or steam cooling. The former would seem to be preferable as in such use there is no limitation regarding the location of the radiator. Engines should be designed to operate at 300 deg. F coolant outlet temperature. This figure is sufficiently below the boiling point of the coolant, ethylene glycol, to retain a margin of safety to prevent boiling of the coolant and is sufficiently high to afford a reasonable air coolant temperature differential to permit satisfactory heat dissipation. With a system so designed the required radiator area may be much reduced over that of a typical water cooled engine and will result in considerable reduction of weight and drag.

One disadvantage with chemical cooling has been an apparent tendency toward extremely high oil temperatures. It seems reasonable, therefore, to design the engine to operate at high oil temperatures, developing an oil with sufficient body at high temperatures to be satisfactory.

In addition to these features the use of a supercharger seems a reasonable method by which to obtain increased power at small expenditure of weight or drag. The use of the supercharger will in the case of low compression engines, at least, result in 20 to 30 per cent increased power. In addition, the number of carburetors may usually be reduced and the overall performance of the engine improved by reason of the more uniform mixture delivered to the combustion chambers. The supercharger could be installed in place of the reduction gear normally used or, if the use of the latter seems desirable, in conjunction with it.

The most desirable engine for our 400 m.p.h. plane appears, therefore, to be of either a Diesel type or of a two stroke cycle type in the latter case with a supercharger. The engine should be of such section as to be inclosed within a circle of diameter not greater than 36 in. or within an oval or other symmetrical section of equivalent area with the propeller axis at the approximate center of area. If a reduction gear is used it should be located in the nose of the engine in such manner as to facilitate streamlining the nose of the plane. The use of a supercharger will permit the omission of the intake stack or stacks and the elimination of the drag thereof.

HAVING DECIDED upon the type of engine the design of the fuselage may proceed. If the cylinder heads or other engine accessories protrude beyond the line of the fuselage, fairing must be provided for such parts. These fairings should be as long as possible with no abrupt changes in section or contour. In designing fairings it would be advantageous to study the direction of the air stream close to the fuselage and in the slip stream. It would seem to be an advantage from the standpoint of reduced drag to have these fairings in line with the actual high speed air stream rather than in a direct fore and aft plane. In any case the number of fairings should be reduced to a minimum and, where possible, fairings should be combined. For instance, if fairings for cylinder blocks are required, the plane may

Launching of the Supermarine-Napier S-4, winner in the 1927 Schneider Trophy Race

The R3C 3 racer of 1926 powered with a geared Packard engine. The high speed of this plane was greater than that of the winning plane but the geared engine was responsible for the reverse propeller reaction which made the plane almost uncontrollable

be so designed that the strut fairing may be included in the cylinder fairing.

The open cockpit, with the windshield, is a particularly serious source of drag. There seems to be no reason for the use of an open cockpit except the prejudice of pilots against being completely enclosed. It should, however, be possible to design a windshield which may be adjusted in flight so that at full speed the cockpit could be completely enclosed while for landing and take-off it could be opened to permit improved vision to the pilot. Means to keep the windshield clean or for cleaning in flight should be provided. The shield should be of such nature as to open fully, in case of emergency, at the touch of a lever.

All recent racing experience has indicated the necessity for supplying fresh air to the pilot. A small duct should be carried well forward in plane, opening to the open air immediately behind the propeller. The air entering this duct should be led to a point in front of the pilot and so exhausted as to sweep past his head but the stream should be so baffled that there will be no sensation of a blast striking him in the face. Means for exhausting the air around the rear edge of the windshield should be provided. The head rest of the cockpit should be faired into the vertical fin, the lower portion of which should be carried sufficiently forward.

The effect of otherwise well designed structures may well be spoiled by the method by which struts and wires are attached to the structural members of the plane. These parts should be installed at angles as nearly as possible approaching a right angle in order to reduce the mutual aerodynamic interference between adjacent portions of the plane. The proper and incorrect methods of attaching float struts are indicated in Figures 2 and 3. In the latter case, the drag caused by interference between the side of the engine cowl and the strut are now known to be more serious than if the lines of the cowling had been expanded to include that portion of the strut adjacent to the engine.

These considerations regarding the beneficial effect of properly installing cowling and fairing are, of course, fundamental but they are factors, the importance of which is frequently overlooked in the design of high speed planes. They become increasingly important as the speed is increased and if neglected may easily set up drag reaction of such magnitude as to completely counteract the beneficial result of increased power. As has already been stated, the reduction of drag may be considered to be the most important feature affecting future high speed planes.

WITH the fuselage size and shape fixed by the power plant, fuel loads and the necessary attachment to the floats, the size and shape of the latter may be considered. The wings may well be considered with the floats, since in an endeavor to keep the wings out of the slip stream, the wings must be attached to the floats. The wings themselves have considerable volume and, if properly constructed, should lend themselves to use as a portion of the flotation system. It seems desirable therefore, that the intra float bracing be built into a wing structure so that, in effect, a portion of the wing is installed in the space between the two floats. The latter should be widely spaced, in order to increase the stability on the water. The outboard sections of the wing would be of cantilever type extending from either side of the floats and with a decided dihedral to provide water clearance in case of a landing with one wing low.

The section of wing between the floats should be so located as to be practically clear of water with the plane at rest thereon. The water tight section of the wing would then provide a reasonable margin of reserve buoyancy so that exceptionally large floats, the normal way of providing reserve buoyancy, would not be required.

Floats in the normal seaplane are responsible for a considerable portion of the drag so that any attempt to reduce their size must invariably result in increased speed of the plane. Then too, since the size of the floats is a function of the weight of the plane any reduction in structural weight must result in smaller floats. The reserve buoyancy, normally expressed as a percentage of the load water line displacement, also influences size of the floats and hence the drag of the landing gear. For the normal commercial seaplane the reserve buoyancy is at least 90 per cent. For racing planes the reserve buoyancy is usually about 50 per cent and this figure was formerly considered to be the safe minimum. The writer, however, has observed a racing plane in which the reserve buoyancy was reduced to 32 per cent without, seemingly, seriously affecting the water performance. It seems possible, therefore, to reduce the reserve buoyancy of the *floats* not including the displacement of wings to approximately 20 per cent with reasonable expectation of satisfactory water performance.

The form of float and wing structure suggested should, of course, only be adopted after thorough test in the wind tunnel and model basin. The shape of the

deck of the floats with the fairing of the wing roots are the especial interest of the wind tunnel The shape of the bottom of the floats falls within the province of the model basin and must be carefully developed to provide ample bottom surface to support the weight of the plane while planing at and below take-off speeds The shape of the bottom best suited for satisfactory water performance should be adopted even at the expense of some additional aerodynamic drag In particular, any tendency to set up between the floats a "wash" or 'roach' of solid water breaking over the top

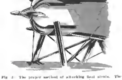


Fig 2 The proper method of attaching float struts. The incorrect method is shown in Fig 3

of the section of wing between the floats, should be avoided In order to avoid this defect it might be well to locate the center wing section well forward of the center of gravity of the plane, obtaining the proper balance by providing compensating sweep-back of the outer sections of the wing system

The wings of the plane would probably be of all metal construction The requirement that they be water tight or relatively so, will introduce interesting but not insurmountable difficulties in the way of construction Then, too, the wings will probably be provided with surface radiators for cooling the engine This radiator might well be located in the center section of the wing, using a very thin gage of corrosion resisting steel sufficiently stiff even in thin gages to be capable of resisting impact with the water, as the skin of the radiator A radiator so located will be especially efficient at taxiing speeds since it would lie in the wash of spray set up by the propeller and floats Cooling at taxiing speeds has always been a problem with racing planes due to the required long run at very low speeds when the air speed over the wing radiators is not sufficient to afford proper cooling Location of the radiator in a position in which it comes in contact with the spray should materially improve the problem

The oil system would, it appears, be similar to that used in the Supermarine S-6 since this system seems to have been very effective. It is probable that less radiator area will be required in the case of the proposed plane than was used in the S 6 because of the high oil-air temperature differential due to the use of higher oil temperature. The amount of heat radiated at any given speed per unit area of surface radiator is directly proportional to the difference between the temperatures of the oil and the surrounding air.

All the original features suggested for a racing plane of the near future, the improved shape and type of engine, the improved fuselage contour and the relocation of the wings were designed to reduce the overall drag and hence increase the speed range These changes will have only minor effect on the landing speed, which is largely dependent on the wing area The effect of improvement in speed range is, therefore, more noticeable at the high speed.

However, clean design, greater speed range and increased power will be of no avail if the power is not sufficiently converted into thrust through the propeller Racing plane operation requires use of the propeller under two extreme conditions, minimum air speed and maximum air speed which normally require propellers of entirely different characteristics This difference is greatly accentuated as the speed range increases The designer is now faced with the problem of providing a propeller with pitch sufficiently low to provide sufficient thrust at getaway speeds for take-off without undue sacrifice of high speed efficiency The two demands cannot be entirely reconciled in the ordinary propeller The day when further progress toward greater speed will be halted by the failure of propellers to operate sufficiently efficiently at both upper and lower extremes of the speed range is fast approaching, if, indeed, it has not already arrived It is at least probable that the disappointing speed of the S 6, considering the power available in the Rolls-Royce engine, was due to the inefficient propeller used. It was probably necessary to set the pitch of the propeller at an angle sufficiently low to permit take-off, accepting as unavoidable the decreased efficiency at high speeds

It seems desirable, therefore, that any future program should devote considerable study to the provision of a

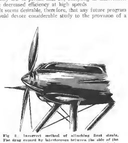
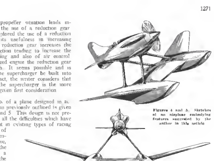


Fig 3 Incorrect method of attaching float struts. The drag caused by interference between the side of the engine cowling and the strut is more serious than if the lines of the cowling were expanded as in Fig. 2

propeller with highest possible efficiency at both extremes of the speed range One solution of the problem would seem to lie in the provision of a variable pitch propeller That such a device can be developed within the next two years seems certain, if funds from the next racing program are made available in sufficient quantities Propellers of this type should, however, be used only after long continued whirling tests followed by service tests on the training racing planes mentioned elsewhere

Consideration of the propeller situation leads inevitably to discussion of the use of a reduction gear The writer has always deplored the use of a reduction gear while recognizing its usefulness in increasing propeller efficiency The reduction gear increases the effects of the torque reaction tending to increase the difficulty of water handling and also of air control However, with a high speed engine the reduction gear cannot be dispensed with It seems possible and is certainly desirable that the supercharger be built into the reduction gear In fact, the writer considers that of the two mechanisms the supercharger is the more important and should be given first consideration

An artist's conception of a plane designed in accordance with the ideas previously outlined is given in the sketch, Figures 4 and 5 This design is not presented as a "cure all" for all the difficulties which have been described as inherent in existing types of racing planes and as a matter of fact, no data from wind tunnel or model basin tests have, to the knowledge of the writer, been obtained of a plane embodying any of the distinctive features described It is possible that difficulties, particularly in water performance, would become evident if such tests were made The writer does, however, wish to reiterate the opinion expressed previously that to follow blindly the policy of obtaining improved speed by increase of power is to invite disaster and disappointment Whereas approximately 3400 hp would probably be required to attain a speed of 400 m.p.h with the conventional type racing seaplane if the relation between the speeds and power of the S-5 and S 6 is any criterion only 2000 to 2200 hp would, it is estimated be sufficient to obtain the same high speed with a plane of the proposed type. The plane depicted would it appears, be a solution, but by no means the only one, to some of the difficulties now faced by any organization sponsoring the construction of Schneider Trophy contenders of the near future



Figures 4 and 5 Sketches of an airplane embodying features suggested by the author in this article

In this connection it might be pointed out that foreign designers are not inactive in bringing out bizarre designs intended to obtain speed by reduction of overall drag without the use of extraordinarily high powers During the past summer reports emanating from Germany have spoken of a floatless racing plane while photographs of what is, apparently, a similar plane of Italian design afloat on the water, have appeared in aeronautical trade periodicals It is thus apparent that the unconventional features proposed for the next American plane are by no means as extraordinary as some of the methods being considered by foreign constructors.

The material requirements for any program should take into account not only the actual racing planes but also the planes for proper training of pilots and for the obtaining of test and design data

For each two pilots entered in the race, one primary high speed training plane would seem to be desirable. For such purpose any of the more efficient commercial high speed or military pursuit planes, provided with wings of reduced area so as to permit high speed landings as well as extreme high speed, and with floats with reserve buoyancy of approximately 60 per cent would be suitable These planes should be used for the original training of pilots inexperienced in flying extremely fast planes, in practicing turns without loss of speed, in fast landings and in water handling of such planes

If unconventional features, such as have been discussed are built into the racing planes, such ideas should be tested in service before they are adopted for the racers For this purpose, it would seem desirable to build what might be called the training race plane This plane would be of the same general type as the actual racers and should use the same type of engine It should, however, have lower landing speed and lower speed range than the actual racers This plane, used as an intermediate training plane, should have characteristics intermediate between those of the primary high speed planes and the actual racers The use of a racing engine in this plane would provide an excellent opportunity for testing the power plant prior to the actual race or in fact to the completion of racing plane

The first plane of the type considered the racing plane should be considered an experimental plane should be built as the "dog ship" and after being tested for water performance as outlined hereafter, should be sand loaded to confirm design calculations

The actual racing plane or planes should then be completed, incorporating therein all the changes and improvements found desirable as a result of the manufacture and test of the training race plane and of the experimental "dog" plane It is considered that if this program is followed much of the difficulties supposedly inherent in the preliminary operation of racing planes will have been discovered in the two experimental planes so that the heart-breaking tests and experiments, which are the normal portions of those interested in obtaining satisfactory operation of racing planes, will be avoided and last minute delays in the preparation of planes largely eliminated

GENERAL NEWS

Herbert T Powell, News Editor

Chamber Reports Sales and Production

Latter Drops About 50 Per Cent From 1929 Figure

NEW YORK (N Y)—Aircraft production data for first quarter of 1930 compiled by the Aeronautical Chamber of Commerce from reports by members shows the anticipated sharp decrease from all 1929 figures In the 3-mo period 501 commercial planes were built by the firms reporting which covered almost the entire industry One hundred and twenty-nine military machines kept them company Aggregate values:

Commercial (without engines)	$3,187,423
Military	1,382 290
Total	$4 569 713

The average price of the commercial planes was thus $6,362, the corresponding military figure being $10,714

For the whole year of 1929 the average value of commercial planes was $6,276 1 per cent lower than this year

For the first quarter of 1930 the commercial production was 80 per cent of the total in number of planes, 69 per cent in value the remainder being military It reached 18 per cent of the commercial figure for the first 6 mo of last year

For the first time, figures on sales are reported separately from those on production Four hundred and nine commercial planes were sold during the 3 mo for an aggregate of $2,360 241 The average price for which planes were sold was thus about 9 per cent below the average value of all those built presumably because of the large carry over from last year of machines of small size and just now being sold at reduced prices

A disturbing feature of the report was the excess of production over sales for the quarter Upon the face of these figures there were 92 more machines on hand and unsold on April 1 than on January 1

Slight Distribution Changes

The distribution of production among general types is much as in 1929, substantially 25 per cent being cabin monoplanes and 60 per cent open cockpit biplanes Changes in distribution from one class to another have been of the order of 1 or 2 per cent

Engine builders report 514 commercial and 386 military engines produced during the quarter, and 452 commercial engines sold The excess of production in this case is less significant than for the planes, as engine builders had a smaller carry-over of stock in their own hands at the end of the last flying season Aggregate engine production values:

Commercial	$1 729 960
Military	2 521 034
Total	$4,241,994

The average value for commercial engines was $3734 as against $3244 in 1929 The increase is believed to be due to manufacturers of small planes with low powered engines having had a large stock of power plants on hand at the end of the last year Production of the cheap power units consequently slowed down whereas the producers of engines of larger size have gone steadily forward with production for immediate installation in planes

Commercial sales of engines and planes were approximately in balance The figure for the former exceeded the latter by 10 per cent, but that corresponds approximately to the demands of multi-engined planes and to the purchases of replacement engines by plane owners.

Aero Chamber Regional Meeting

DENVER (COLO)—Eight states will be represented at the first regional meeting for the western district of the Aeronautical Chamber of Commerce which will be held here July 11 12 About 200 delegates from those states are expected to attend the conference

Michigan Approves Fourteen Aviation Schools

LANSING (MICH)—Fourteen aviation schools have been approved recently in Michigan by the Michigan Board of Aeronautics under terms it has promulgated In general the state rules concede to a large extent with the provisions of the federal flying school regulations The four grades of schools are: Class A—Those eligible to train pilots up to and including the transport rating, Class B—To and including Limited Commercial, Class C—Private, and Class D—Ground school only

The following schools have been approved

Class A—National Airways Inc, Detroit; Curtiss Flying Service Inc, Detroit; Furniture Capital Air Service, Grand Rapids.

Class B—Mathewson Airways Inc, Detroit; Skyways Inc, Pontiac

Class C—Anderson School of Flying, Detroit; Challenger Flying Service, Detroit; Detroit Eaglerock Sales Corp, Detroit; Hammond Flying Service, Owosso; Nimke Flying Service, Detroit; Maycock Flyers Inc, Detroit; Michigan Airways Inc, Lansing; Michigan Aero Corp, Ypsilanti; Triangle Flying Service, Plymouth

Jacksonville-San Diego Record by Brock, Schlee

JACKSONVILLE (FLA)—A new transcontinental record on a new route was made by a pair of habitual record breakers on June 17 and 18 William S Brock and Edward F Schlee, in their most notable joint exploit since their trip from Detroit to Tokio 3 yr ago, flew from Jacksonville to San Diego in 13 hr 56 min, stopped in San Diego 1 hr 11 min; and flew from San Diego to Jacksonville (with one stop) in 16 hr 50 min Total elapsed time was 31 hr 57 min. Total flying time was approximately 30 hr 20 min.

The machine used in the present flight, the latest of a considerable series of high-wing monoplanes of various makes that Brock and Schlee have employed was a Lockheed Vega with Wasp engine

The westward flight was non stop Coming east bad conditions were encountered, including severe electrical storms A landing was made at Tallulah, La, to take on gas Over-shooting the field at Jacksonville on final arrival, the plane was badly damaged, but the occupants not at all Preliminary plans for the flight called for the carrying of a two-way radio set and a gyroscopic flight instrument for blind flying, but apparently no use was made of the radio

Average Speeds Differed

The air line distances flown were 2,112 mi each way making the average for the westward trip 151 7 m p h On the return the average was 125 5 m p h This compares with Lindbergh's record of 14 hr 46 min over the course of 2 510 mi from Los Angeles to New York an average of 170 1 m p h, and with Frank Hawks' round trip flight between those cities in a total elapsed time of 44 hr 3 min over a course 18 8 per cent longer than that flown by Brock and Schlee Hawks' flying time was 36 hr 49 min.

Eastbound flights have always in the past been quicker than westbound ones The opposite tendency in Brock and Schlee's record was accounted for by the stormy conditions on the return trip and by the southerly course followed which kept them below the latitudes where prevailing westerly winds are very strong

Plan for Anderson (Ind.) Races

ANDERSON (IND)—George Hockett Post of the American Legion will sponsor the second annual air races at Welch Field, near here on July 4 Nine events are scheduled, and $2 000 is to be offered in prizes

Byrd Expedition Back From Antarctic Flights

NEW YORK (N Y)—The greatest exploration expedition on which aircraft were depended upon as the main medium of penetrating the territory to be studied, came to an end here June 19, with the arrival of the party commanded by Rear Admiral Richard E. Byrd There followed the usual acclaim which New York, Washington and other communities have become accustomed to honor outstanding achievements, following which the expedition was disbanded except for the technical staff This group will continue compilation of the scientific data derived by the expedition

The outstanding aspect of this trip for aviation is the fact that from beginning to end the expedition has been operated on the premise of aircraft operations The climax was the flight of the Floyd Bennett, a Ford transport powered with a Cyclone and two Wright Whirlwind wing engines over the South Pole on Nov 28, 1929 A number of important aerial photographing, surveying and transporting flights were made before and after by a Fairchild a General and a Universal The last was destroyed by high winds early in the expedition's work on the Barrier while on a transportation trip

Planes Suitable for Polar Work

Use of aircraft in exploration in the Polar regions has been demonstrated as practicable by the two remarkable polar exploits by Commander Byrd—the flight over the North Pole in 1926, and over the South Pole in 1929 Aircraft also has made such work much more comfortable less hazardous and vastly more efficient These attributes are provided by speed and mobility of aircraft, ability to negotiate above the rough surfaces featuring all Polar regions When first aircraft was suggested for this kind of work, the opinion was almost universal that heavier-than air craft at least, would not be suitable In the minds of many this belief was strengthened by the experience of Raould Amundsen, in 1925, when he flew to the Arctic with two Dornier Wal flying boats.

While Amundsen was having his 1925 experience with the Dornier flying boats, Byrd was in the neighborhood of Greenland using three Loening amphibions for experimental exploration with this type of transportation on his own account In spite of unfortunate weather and other difficulties the use of the airplane appeared feasible to Byrd and his party

Industry Holds Dinner

The next year, when Amundsen was resorting to the airship, Byrd and Bennett appeared at Spitzbergen for the flight to the North Pole bringing with them a heavier-than-air craft the Fokker fitted with three Wright whirlwinds This flight to the North Pole was made on May 9, 1926

The aviation industry honored Admiral Byrd with a dinner at the Hotel Astor on June 25 This event at which a special medal was presented to the guest of honor, was held under the auspices of the Aeronautical Chamber of Commerce Maj Lester D Gardner was chairman in charge of the dinner

Admiral Byrd reported that the expedition's planes flew about 7,100 mi in the Antarctic and about 160,000 sq mi were included in the surveying and mapping operations Obviously the extended use of the aerial camera to polar exploration was of great benefit to science and the general knowledge of those regions The entire distance between the base at Little America and the South Pole was photographed, making a strip map 1,600 mi long

Elmer A. Sperry Dead

Dr Elmer A Sperry, inventor noted in many fields but especially in those of marine and aerial navigation, died on June 16, at the age of 69 Born in Cortland N Y, on Oct 12, 1860, Dr Sperry took up the study of machinery in his early youth and devoted the remainder of his life to the improvement of mechanisms and the development of new ones, especially those dependent on the gyroscope He was founder of the Sperry Gyroscope Company, now owned by North American Aviation, Inc

His most notable aeronautical activities and services to the aeronautical world were in the improvement of searchlights and aviation beacons, in the development of the Sperry automatic pilot (in co-operation with his son, the late Lawrence B Sperry), and in the production of gyroscopic artificial horizons and navigating instruments for use in fog Deeply interested in international affairs from a scientific point of view, Dr Sperry was instrumental in gaining appreciation of the United States for scientific work done in the Orient and especially of the aerodynamic work done at Tokio by Dr Sperry's friend Baron Shiba

Dr Sperry had received, largely for his services to ocean navigation, decorations and honors from governments and scientific societies innumerable

Boeing Rebuilds Wheels

SEATTLE (WASH)—Boeing Airplane Co reports success with the use of wheels, 54 by 12 in, formerly having a 20 in drum and a 2½-in face, which have been rebuilt to provide a 26-in drum with a 3-in face The remodeled wheels are used on tri engined Boeing transports which weigh approximately 8¾ tons when fully loaded

Federal Rules for Tennessee

NASHVILLE (TENN)—Federal air commerce regulations have been adopted for use in Tennessee by the advisory board of the state division of aeronautics

HIGH POINTS in the NEWS

▶ *Facts* Aeronautical Chamber of Commerce issues report on plane and engine sales and production for first quarter of 1930, latter showing a big drop from 1929 figure

▶ *Performance.* Representatives of six of eight universities selected as centers for providing impartial performance test data on planes met June 21 with Aero Chamber committee

▶ *Washington* Department of Commerce issues word that after July 1, parachute riggers must be licensed

▶ *Exhibited* First showing of Curtiss-Bleecker helicopter takes place at Valley Stream, L. I, June 18

▶ *Combination* A glider which may be used for primary and secondary training, for soaring, with a power plant, and as an amphibion is being manufactured by Bowlus Sailplane Co.

Foreign

▶ *Entries* International Light Plane Tour, to be held July 20-31 and cover approximately 4,660 mi, draws 98 participants

▶ *Monetary* Reichstag gets German aviation budget of about $11,000 000 for 1931 which is an increase of some $1,715,000 over the 1929 figure.

Airports and Airlines

▶ *Passengers* Varney Air Lines will start passenger service shortly over mail lines between Portland Tacoma-Seattle and between Spokane-Pasco

▶ *Organized* Airport drainage and surfacing committee is formed jointly by American Engineering Council, American Road Builders' Association, and Aeronautics Branch

Pacific Aeromotive to Move

LOS ANGELES (CALIF)—Head quarters of the Pacific Aeromotive Corp, Pacific Coast distributor of Wright aeronautical products and other aviation accessories, will be moved on July 1 to the new municipal hangar now under construction at Los Angeles Airport This building will have a total floor space including offices, of 27 000 sq ft, and is constructed of steel, concrete, and hollow tile The company operates a branch office at the Los Angeles Metropolitan Airport, Van Nuys, the Oakland Municipal Airport, and is planning another branch for the Portland Airport, Portland, Ore Present quarters of the firm located on Angelus Mesa Drive will be kept for shop use

View Curtiss-Bleecker Helicopter at N. Y. C.

VALLEY STREAM (L. I.)—Test flights on the Curtiss-Bleecker helicopter were postponed temporarily following the first public showing of the machine at the Curtis airport June 18. It was planned to fly the machine at that time but a leak in the oil system of the engine prevented. Following completion of the necessary changes another date will be set for the test flight.

The helicopter, designed by Maitland B Bleecker and developed through the facilities of the Curtiss company, has a number of interesting features. The power plant is a Pratt & Whitney Wasp engine mounted with crank shaft in vertical position, and driving four four-bladed propellers, each one of which is located below and ahead of the leading edge of one of the rotating vanes. The system of gearing is such that the shaft connecting the engine crankshaft and propeller shaft turns at a speed relatively lower than that of either engine or propeller in an attempt to avoid vibration of the long shaft. There is no propeller on the nose of the body of the machine; the directional effect is expected to be obtained by inclination of the vane system.

All Control Devices Unique

Each vane is equipped with an auxiliary surface attached behind it by means of outriggers and by changing the incidence of the auxiliary surface or "stabovator" the incidence of the vane is changed. By an ingenious mechanical control it is possible to actuate the vanes by a normally operated control stick. Normal control of the auxiliary surfaces is such that those at the sides of the body act as ailerons and those at the front and rear as elevators, the incidence of the vane changing as the system rotates. An additional control makes it possible to move all stabovators in the same direction simultaneously. The stabovators have an area of 12½ sq ft each. The area of the wings exclusive of stabovators is 322 sq ft.

The control considered somewhat comparable to the rudder of a normal plane is a surface at the rear of the fuselage or body, but hinged on a line parallel to the longitudinal axis rather than the vertical axis. The surface is controlled by ordinary pedals.

Small Fan Cools Engine

Gasoline and oil tanks are mounted in such a way that they turn with the rotating vane system. Electrical connections for engine control are taken off of the rotating system through the use of a commutator arrangement, while an ingenious system of gearing makes it possible for the pilot to have what amounts to a virtually normal throttle control. A tripper device has also been worked out to turn off the gasoline feed while the rotor is in motion. A capacity of 30 gal. of gasoline is provided. Cooling the engine is accomplished by means of a 32-in diameter fan mounted above the engine cylinders and working in conjunction with baffles for each cylinder.

The Curtiss-Bleecker on view at the Curtiss-Wright Airport at Valley Stream, L. I. Note the "stabovators" trailing below each wing and the small rudder at the stern

The landing gear is conventional except for unusually large travel of the Oleo system and an ingenious tension strut has been worked out for the tail wheel to leave the rear seat unobstructed. The tail wheel is Micarta and has a 360 deg. travel. The gross weight of the Curtiss-Bleecker helicopter is 3,400 lb of which approximately 20 per cent is useful load.

New Vought Corsair Received by the Navy

ANACOSTIA (D. C.)—At the Naval Air Station here, the latest of the Vought Corsair line was flown on June 18. First to be delivered of an order of 36 the O3U I was given a trial. After four minor modifications of the original Corsair made to improve military characteristics, to remedy spinning difficulties and for other reasons, this machine is the first of its line to be classified as a major redesign of the Corsair. Like its predecessors it will be either landplane or seaplane used either from carriers or from catapults. Like them also it will be an observation plane but equipped for self-defense.

Another machine under present naval consideration is the XF8C-4, an experimental two-seater fighter produced by the Curtiss company. It is the fourth of a series of minor modifications of a design which started as a revision for fighting service of a Curtiss Falcon with a Wasp engine installed in place of the water-cooled power plant. The type is still classed as experimental and no orders have been placed in quantity.

D.A.C. Sells 13 Planes, 5 Gliders

DETROIT (MICH.)—Detroit Aircraft Corp reports that recent sales include three Lockheed Sirius planes, three Eastman yachts, two Parks planes, three Lockheed Vegas, one Eastman Amphibian, one Ryan Brougham, and five gliders.

Require Licenses For Parachute Riggers

WASHINGTON (D.C.)—Persons caring for parachutes must hold a Department of Commerce Parachute Rigger's license after July 1, according to regulations just published. This applies to any person who packs, repairs or is charged with the inspection and maintenance of parachutes. Applicants must be at least 18 yr old, and must show that they have packed twenty or more parachutes which have been satisfactorily jumped or drop tested.

If not revoked or suspended, licenses remain in force for 2 yr, and may be renewed for the same period on presentation of evidence that the rigger has rendered service under his license for at least a year and has packed during that time at least 25 parachutes which have been satisfactorily tested. Even the licensed rigger, however, is allowed to make only minor repairs when major repairs are required; parachutes must be sent to the factory or one of its repair depots. Otherwise the holder of a parachute rigger's license will be permitted to pack, repair, inspect and maintain any parachute used with civil aircraft in this country.

Approve Stinson Jr. as Seaplane

WASHINGTON (D. C.)—Approved Type Certificate No 295 has been awarded to the Lycoming-powered Stinson Junior cabin plane, equipped with Edo Model 3300 floats. This is the four-passenger popular priced Stinson which was announced as a landplane at the St. Louis Show. The A.T.C. is the 27th granted to seaplanes with Edo floats.

Move From Rockwell Approved

WASHINGTON (D. C.)—A favorable report on the Kahn bill to transfer the Army's flying activities from Rockwell Field, North Island, to two sites in the San Francisco Bay region has been made by the House Military Affairs Committee and the bill submitted to the House. [See June 21 issue of AVIATION.—Ed.]

Performance Testing Group Holds Meeting

GARDEN CITY (L. I.)—Progress of the performance testing committee of the Aeronautical Chamber of Commerce was reviewed and plans for the immediate future outlined at a meeting held June 21 at the Curtiss plant here. Representatives of six of the eight universities selected by the committee as centers for the proposed nation-wide program of performance standardization were present and witnessed tests on a Challenger-powered Curtiss Robin, the first of seven airplanes to be tested. Prof. Alexander Klemin of New York University, chairman of the committee presided.

The purpose of the committee is to provide performance testing service on an impartial basis to manufacturers throughout the country at a minimum cost, utilizing the various universities of standing, with programs of interest in aeronautics, as centers at which to conduct the tests. The first of seven planes to be tested was the Curtiss Robin. It was chosen by lot in order that the committee be able to start functioning immediately. Other tests are planned for the several universities beginning Aug. 15.

Modification Made

During the morning session a suggested procedure for standardized performance testing was submitted to those present and a number of modifications made in the rulings to govern the tests. It was decided to issue two documents to be sent to every manufacturer of airplanes in the country, one a detailed description of the methods suggested, calculations, and calibration of instruments, and the second a technical manual mainly for the use of members of the committee in their work in conducting the tests. Of the nine characteristics of airplane performance suggested for possible test four were temporarily omitted because of the difficulty in measurement.

The five remaining characteristics are: (1) high speed at sea level and at altitudes; (2) climb to 10,000 ft.; (3) service ceiling; (4) minimum speed power on; (5) minimum speed, power off.

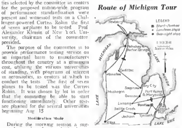
New Members Discussed

It was decided further that tests be conducted at the rated engine speed insofar as possible, and where other engine speeds were used that the deviation be specified in the certificate issued by the committee.

Among the questions discussed were the qualifications for new universities seeking to become members of the committee, and it was decided that all applications be submitted to the Aeronautical Chamber of Commerce, whence they would be placed before the committee and returned with the committee opinion to the Chamber of Commerce for final analysis. The regional plan of the Aeronautical Chamber of Commerce is to be employed in formation of geographical territories to be served by each university.

The questions of compiling a list of accepted instruments and the calibration of instruments for testing also were discussed. Other matters that came before the committee were cost to manufacturer and insurance coverage for the test.

Route of Michigan Tour



SHOWING THE COURSE of the second annual Michigan Air Tour which is to take place July 10-18. The event will start from and end at the Pontiac Municipal Airport. Entry blanks and information on the event may be obtained from the Pontiac Board of Commerce, which is sponsoring the affair.

Advertise Plane Carrier Bids

WASHINGTON (D. C.)—Secretary of the Navy Charles F. Adams announces the advertising of bids for construction of aircraft carrier No 4. Noon of August 12 is set by the Navy Department as the closing time for receipt of bids on the ship, whose cost, including armor and armament, is not to exceed $19,000,000. Appropriations totalling $600,000 for the current fiscal year and $3,450,000 for 1931 are provided for the carrier. Aircraft carrier No 4, which is to have a displacement of 13,800 tons, will be the first built from the keel up as a plane carrier for the fleet, the carriers "Saratoga" and "Lexington" having been converted from battle cruisers and the "Langley" being a converted collier. With this new ship, the carrier tonnage will total 90,086 tons.

D.A.C. Gets Order From Navy

DETROIT (MICH.)—The Detroit Aircraft Corp has been awarded its first Navy contract for 32 torpedo and bombing planes to be powered by Wright Cyclone 575 hp engines. The contract totals $827,349.50.

No Military Planes To Moscow, Says Stimson

WASHINGTON (D. C.)—The United States State Department draws the line at the shipment of military equipment to the Soviet government. That fact was made clear on June 16, when the Secretary of State announced that while there would be no attempt at enforcing an embargo he would "view with disfavor" the exportation of military planes under a contract pending between the Glenn L. Martin company and the Soviet government.

Report had it that the contract would have been for twin-engined bombers and would have amounted to $2,000,000. The Amtorg Trading Corp., commercial representative of the Soviet Government in the United States, has denied placing any such contract, but not that negotiations had been in progress. The machines would evidently have been of a new type, as the Martin company has built no twin-engined planes except flying boats for some 5 yr.

Like many other American companies which have done business with the Soviet government, the Martin company was likely to have made arrangements for training Russian mechanics and to have taken responsibility for building up an industry in Soviet territory.

The State Department's objections are specifically restricted to military equipment. No indication was given of any reluctance to see American commercial airplanes sold and shipped to Soviet purchasers.

Boeing Announces Ground School Changes

OAKLAND (CALIF.)—Changes in the number of instruction hours and in the prices of various ground school courses are announced for the Boeing School of Aeronautics by Manager T. Lee.

They are: Private pilot course raised from 25 to 45 hr. and from $25 to $40; Limited Commercial course raised from 70 to 150 hr. and from $70 to $140; Transport course raised from 140 to 195 hr. and from $140 to $180.

The former airplane and engine mechanic course has been divided into two sections—airplane mechanic course, 190 hr. for $220, and the engine mechanic course, 190 hr. for $210. Evening classes are to be discontinued.

The Boeing School of Aeronautics will be enlarged to the extent of 9,000 sq ft. through a contract recently let to the Austin Company.

Lincoln Announces Light Engine

LINCOLN (NEB.)—The new Lincoln Rocket, a 25-30 hp., 2-cyl. aircooled aviation engine, particularly designed for power gliders, is to be put on the market in the near future by the Lincoln Aircraft Co. A recent run of 35 hr. on a block test has been completed with satisfactory results.

AERONAUTICAL FINANCE

BY R R DOANE

Weekly Comparisons

Aviation	Week Ended June 19	Previous Week	Same Week 1929
Aviation stock averages	21 10	21 38	42 65
Number of stocks traded in (1)	49	46	64
Volume aviation share sales (2)	601 900	415 800	827 500
Ratio aviation share sales to total share sales (3)	1 89	2 46	3 26
General Market Data			
Total volume share sales N Y and Curb Exchanges	31,692,000	16 892,300	25 308 970
Railroad share sales N Y S E	525 140	208 670	630 200
Market averages (N Y Times)	217 25	229 18	290 32
New domestic financing	$135,423 000	$58,772 500	$46 168 451

Notes—(1) All stocks actively traded in on both New York Stock Exchange and the Curb Exchange (also contains over-the-counter stocks on which bid and ask quotations are regularly published (2) Total volume both N Y Stock and Curb Exchanges (3) Percentage of aviation stock trading to total volume of sales all classes of stocks on both exchanges.

Underlying Factors

SOMETHING more potent than a professional bear raid has shaken security values to their foundations during the past fortnight.

Along with this avalanche of values went the air stocks—all of them They were not leaders in the decline by any means but, with a few exceptions the previous gains made earlier in the year were wiped out Many of these shares went beyond bargain levels while others, after a superficial rally, may yet drop to new lows before the period of adjustment has run its course

Quite regardless of the numerous reasons advanced for this discomforting situation we are now realizing that a period of readjustment is something more than mere economic phraseology and that the extravagant abuse of capital cannot take place even in America, without its unpleasant reaction. Thus the evils of over-expansion must be inevitably followed by stern corrective measures

Capital reconstruction is not a thing to be feared in any industry regardless of its necessity It is in its postponement that the greater costs may be experienced Like any major operation the sooner accomplished the better for all concerned In speaking of the possible avoidance of imminent receiverships we are not by any means overlooking the considerable rebuilding of capital structures with which this industry is inevitably faced In this regard voluntary reconstruction is far more to be desired than involuntary enforcement.

The elements of decision in any given situation, insofar as management of corporate capital is concerned are dependent in large measure upon a clear discernment of the major factors involved During such periods these factors may be said to form themselves into two groups—*adverse* and *corrective*

Adverse Factors

In this respect we have taken those elements usually found present prior to corporate reorganization and have applied them to a list of representative aircraft companies selected because of their ability to supply a complete cross section of the industry As to the degree of influence of these factors upon the various individual companies there will doubtless be considerable differences of opinion, but as to the primary fact of their existence at this time there is more or less uniform agreement.

In the accompanying chart digest (Table I), for purposes of simplification, we have allowed an arbitrary figure of 10 per cent for the presence of each factor among the various companies No attempt has been made to weigh the factors according to their degree of importance in influencing the individual company. Such influences would naturally vary among the units We are simply engaged in ascertaining, insofar as it may be possible, the extent to which these adverse factors may or may not have thrust themselves among the various units of the industry

Further the fact that many of them may be found present does not necessarily mean that these companies will attempt, or even be forced to attempt, any immediate remedial program It is always quite possible that other internal corrective factors even though invisible may have their neutralizing effect

Table I—Estimated Presence of Adverse Financial Factors Among Representative Aircraft Companies

Factors (Usually found present prior to reconstruction of existing financial plan)	Holding Companies: Aviation Corp	Bendix Aviation	Curtiss-Wright	Detroit Aircraft	Fokker Aircraft	United Aircraft	—Manufacturing Companies—: Aero Supply Mfg	Bellanca Aircraft	Consolidated Aircraft	Curtiss A & M	Douglas Aircraft	Kinner Airplane	Waco Aircraft	Warner Aircraft	Stinson Aircraft	Wright Aero	Transport Co.s: Av'n Corp of Am	Nat'l Air Trans	Transc'l Air Trans	Western Air Express	Number of Companies in Which Factor is Present
1 Larger capitalization than earnings warrant	10		10	10				10				10						10	10		7
2. Conversion of current assets into fixed assets			10																		
3. Expansion out of assets that should have been supplied from fresh funds			10																		
4 Declining reserves	10		10	10				10				10		10			10		10		8
5 Declining net worth		10	10	10				10		10	10					10					7
6. High inventory position			10	10			10	10	10	10		10	10	10		10					10
7 Inadequate gross revenues	10		10	10				10	10			10		10		10	10	10	10		11
8. Unfavorable market conditions	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	20
9 High operating ratio	10		10	10	10	10	10	10		10	10		10	10	10	10	10	10	10		16
10 Old patterns	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10		19
Per Cent Present	60	30	100	80	30	30	40	80	40	50	40	60	40	60	30	60	50	50	60	10	

Table II—Comparative Values

Company	Common Shares Outstanding	Book Value per Sh	Price Range 1929-1930 High	Low	June 21 Close	Per Cent Change	Price Earnings Ratio	Earnings per Sh 1929	Earnings 1st Q 1930
Aviation Corp	5 185 425	$11 60	20	4⅞	5	—75		d. $0 25	d $0 27
Bendix Aviation	2,092 457	15 20	104⅞	25	30	—71	8 4	3 54	36
Curtiss-Wright	6 270 375	8 40	30⅛	6⅞	7	—76		d. 66	d 26
Detroit Aircraft	839 000	6 04	17⅞	5	5½	—70		d. 82	
Fokker Aircraft	956 000	12 75	67⅞	8	17⅞	—74	48 3	37	
North American Aviation	2 100 000	11 91	64⅞	7⅞	7½	—87	8 2	95	27
United Aircraft	1,643 417	13 40	162	31	46½	—71	11 5	4 02	39
Aero Supply Mfg	391 261	5 14	50	5⅞	8	—84	16 6	48	
Bellanca	174 250	9 90	24	4⅞	13	—49		d. 65	
Consolidated Aircraft	579 000	3 50	44⅞	13½	19	—56	11 5	1 64	
Curtiss A & M	19 107	26 30	173½	50	58½	—70		2 19	d 3 20
Douglas Aircraft	339 000	9 20	45⅞	12½	18⅛	—60	13 5	1 19	
Kinner A & M	1 940 000	.70	6⅞	1	1	—85		d.	
Stinson Aircraft	124 000	4 40	26½	12⅞	25	—05	227 2	11	
Waco Aircraft Co	145 000	6 40	28	19⅞	5	—82	8 8	75	
Warner Aircraft	400 000	2 10	39⅞	2⅞	3½	—91		d.	
Wright Aero	300 000	20 90	299	50	47⅞	—83		1 58	d 1 28
Aviation C of Am	521 026	18 60	89⅞	20⅞	38	—57		d. 62	
National Air Transport	650 000	5 50	48⅞	10	15	—69	14 5	1 03	19
T A T	730 000	9 58	35	5⅞	5⅞	—83		d 1 33	
Western Air Express	155 000	36 10	78⅞	15	35	—55	4 8	7 15	

This, of course, can only be left to the future to determine. Much depends, in this respect, on the time element involved in its race with depleting reserves, for the development of profitable market outlets beyond the present supporting back-log of government and transport orders.

From the standpoint of common-sense frankness it seems a bit premature to assume the aircraft industry to have reached the bottom of the trough of readjustment. Also its marketing development problems combined with the still-to-be-faced capitalization reconstruction appears too deep and far reaching to encourage other than cautious optimism in hoping for any considerable degree of correction during the next 3 or even 6 mo.

Corrective Factors

Stripped of all minor conditioning elements a broad outline of the major corrective factors may be said to be somewhat as follows

1 Complete correction of excess inventories.
2. Technological advance
3 General trade recovery
4 Increase in gross volume.
5. Increase of cash and net working capital
6 Replenishment of depleted reserves.
7 Reduction of operating ratios
8. Some form of competitive regulation.
9. Ability to expand through new financing
10 Further economies through more efficient consolidations

Of these corrective factors only half can be said to rest directly under the possible control or initiative of the industry itself—the remainder being more or less dependent upon external conditions Also further examination discloses that ; (1) inventories of finished stock have probably already been three-fourths liquidated (2) technological advance is favorably moving forward, (3) general trade recovery although disappointingly slow is surely getting under way, (4) increase in gross volume to the industry is very unlikely to be much larger than 1929 (5) cash and net working capital position should improve with inventory reduction and prompt collections, (6) replenishment of reserves dependent upon enlarged net earnings, (7) reduction of operating ratios unlikely this year, (8) reciprocal agreements and competitive co-operation not visible at present, (9) new financing unlikely in present unsettled market, and (10) further consolidations are probably under way awaiting more opportune time for consummation.

Such an analysis seems to point to: (1) uniformly, though transient unfavorable market conditions, (2) a higher competitive situation than an industry of this character can comfortably support, (3) uniformly high operating ratios (4) fairly high inventories in a field where obsolescence increases the danger, (5) larger capitalization than present or near future earnings justify, and last, that consolidations, although ordinarily advantageous in any industry, may prove awkwardly embarrassing when consummated at the peak (1929) of a high and inflated fixed capital market

Financial reorganization, should it overtake one or more companies of this industry, would not necessarily mean a series of compromises and forced sacrifices imposed on security holders or company creditors. It will mean a re-arrangement of the individual company's liabilities so as to make them conform more closely to assets and earnings, thus placing the company in a position to obtain additional working capital coincident with sound growth. In other words it means the re-mobilization of its resources to meet the new conditions a changing situation demands One financial plan will merely replace the older plan that has proved faulty. From such a basis better results to all may be achieved.

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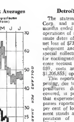
Aviation Stock Averages

1929-1930 comparisons (January-June)



Note For full explanation as to compilation of these averages see AVIATION Statistical Number, March 22, 1930 page 590

Canadian Vickers, Ltd.

The annual financial statement of Canadian Vickers, Ltd., for the fiscal year ended Feb 28, 1930 discloses a sharp reduction in operating profits due to a falling off in earnings of the company's marine and aviation departments. Operating profit for the year amounted to $300 960, compared with $437 311 in the preceding year Depreciation at $181 000 left a net deficit for the year of $45 000 against a net profit last year of $125 284

Detroit Aircraft Report

The statement of Detroit Aircraft Corp and subsidiaries for the six months ended Dec. 31, 1929 (including operations of subsidiaries from approximate dates of acquisition only) shows net loss of $733,077, after removing development and experimental expenses special collection losses, and provision for contingencies The consolidated income account shows net sales of $837,039, costs and ordinary expenses of $1,206,855, operating loss of $369,816

This reported loss although not surprising, due to large non-recurring expenditures during the brief period covered, is proportionately large than that experienced by other larger companies reporting losses for 1929 The per cent of loss to total capital investment stands at 04 0 for Aviation Corporation of Del, 01 0 for Curtiss-Wright as compared with 07 6 for Detroit Aircraft, or a loss of .82 cents per share

In the absence of the year-end balance sheet little can be gained at this time in correctly estimating the full extent of the company's adjusted asset and liability position

• • •

Douglas Unfilled Orders

Word from the Douglas Aircraft Co, Santa Monica, Calif, reports unfilled orders on the books of $4,030,771, all on military planes. During the second quarter of 1930 Douglas made deliveries at a rate two and one half times as great as for the second quarter of 1929 Operations at the Douglas plant are now proceeding at full capacity with approximately 1,200 persons employed. Finishing touches are being given to the new twin-engined Douglas amphibion and flight tests are scheduled for early in July No orders are being taken as yet on this machine but a large volume of inquiries is reported.

• • •

Ex-Cell-O Dividend

Ex-Cell-O Aircraft and Tool Corp declares a quarterly dividend of $0 20, placing the stock on an annual basis of $0 80, compared with $1.20 previously.

• • •

Irving Air Chute

Irving Air Chute Co declared a quarterly dividend of $0 25, payable July 2, to stock of record June 18 This places the stock on a $1 annual basis against $1 50 previously Decision by directors to reduce the rate was made in order, it was stated, to conserve cash for the building of new factories in Europe and South America.

• • •

New Wright Contract

Bureau of Aeronautics of the Navy has placed an order with the Wright Aeronautical Corp, a division of the Curtiss-Wright Corp, for 272 Cyclone engines, costing $1 974,019 Company was recently awarded Army contract for 128 of these engines costing $742 643

Bowlus Produces New Type Sailplane

SAN DIEGO (CALIF)—A combination sailplane which may be used for ground training, primary and secondary gliding, and for soaring, and which may be converted into a power plane and an amphibian glider, is now being manufactured by the Bowlus Sailplane Co, Ltd, of San Diego Convinced of the utility of the combination sailplane, the Bowlus company has discontinued the manufacture of primary gliders and is centering its efforts on sailplane manufacture, says R E. Pollock, general manager

By replacing the 14-ft center section with a 2-ft section and removing the wings, the machine may be towed along the ground while the student learns the manipulation of rudder and elevators Going into the primary glider stage, the 2-ft center section is retained and the wings are attached, the special 2-ft center section giving them a dihedral of 5 deg This practically removes the necessity of ailerons, it is said The landing gear is retained for towing For use as a secondary glider the 2-ft. center section is replaced by the 14-ft section and the wings are attached with the dihedral removed. The wheels are retained

Engine Inexpensive

In making a soarer of the sailplane the large center section and wings compose the regular 60-ft. span of a Bowlus sailplane and the wheels are removed so that it may be launched with a shock cord. The sailplane may be converted into a hydro-glider by the use of a canvas boat made to fit over the fuselage. This boat is equipped with a sled, so that the sailplane may be landed on water or land The sailplane is designed so that an engine can be installed at a cost of about $200

One great advantage claimed for the combination sailplane is that the student uses the same set of controls and the same cockpit from the beginning of his primary training to the time when he becomes a licensed soaring pilot Moreover, by taking primary training in a cockpit such as provided by the Bowlus sailplane the student is, from the first, taught to watch the horizon and not to look at the ground.

The combination sailplane has the same specifications as the former Bowlus sailplane The wings are each 18 ft. long; each wing tip aileron measures 5 ft. The 14-ft center section fitted when the plane becomes a soarer makes the total span 60 ft

Substitution of the 2-ft. center section with its 5 deg dihedral in place of the 14-ft center section, when the plane is converted into a primary glider gives it a 48-ft spread The fuselage is 21 ft 3 in long The complete sailplane weighs 350 lb Removing the landing gear may be done by extracting six bolts The landing wheels are equipped with 13x5-in glider balloon tires

The price of the new combination sailplane is $1,095 complete at the factory Bowlus officials say that this combination cuts about 40 per cent from the investment necessary to purchase both a primary glider and a sailplane bought separately. The Bowlus factory now is producing two combination sailplanes per week and expect to raise it to five per week within a month This plane already has been adopted as standard equipment for the Ferron Aviation School, Berkeley, Calif

Houston to Arrange Balloon Race After All

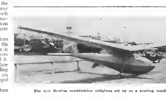
WASHINGTON (D C)—Announcement has been made here that the National Elimination Balloon Race will be definitely held at Houston, Tex, on July 4 A reorganized committee of Houston business men is proceeding with plans for the event. These races will be held as competition for the Litchfield trophy and also to select entrants for the Gordon Bennett International Balloon Races to be held at Cleveland on Sept 1

Lieut Thomas G W Settle's entry into the Houston races was announced by the Navy Department Last year he won the National Balloon Race with a flight from Pittsburgh to Prince Edward Island, Canada, setting a world's record —925 mi, 43 hr, 2 min.—for distance and the fifth, sixth, seventh and eighth balloon categories

The Cleveland Chamber of Commerce has selected Charles H Roth and William P. Carey, both connected with the Goodyear organization, to pilot the Cleveland entry

Fairchild Financing Announced

NEW YORK (N Y)—Stockholders of Fairchild Aviation Corp (division of The Aviation Corp) have been offered one share of The Aviation Corp common stock in exchange for three of the Fairchild stock There are 540,000 shares of Fairchild stock outstanding and the transaction should realize about $1,170 000 for Fairchild interests It will be used in the airplane manufacturing division Rights may be exercised up to Aug 11



The new Bowlus combination sailplane set up as a soaring machine

Flight of Soucek's No Seaplane Record

WASHINGTON (D C)—Calibration of the instruments carried by Lieut Apollo Soucek in his altitude flight at Anacostia, Md., on June 13, show that he reached a ceiling of 39,140 ft, which is 580 ft in excess of the world's seaplane record which he established on June 4, 1929 This new achievement falls just 76 ft. short of setting a new world's record, since F A I, rules require that the pilot must exceed the existing mark by 200 m, or 656 ft. to establish an official world's record.

Some confusion resulted from the fact the F.A.I ruling until Jan. 1 required that a record be broken by only 100 m or 328 ft, and that the change in this requirement remained generally unknown in Navy circles at the time Lieutenant Soucek made his latest record attempt. The N.A.A., however, maintain that the Navy Department was notified at the time of the change, but the Navy has continued to cite the figure 100 m in its published statements without correction from the N A A

Lieutenant Soucek's flight was made in a Wasp powered Wright Apache equipped with pontoons He remained in the air for an hour and forty-five minutes, and reached an altitude where the temperature was 61 deg. below zero, and the air pressure 143 mm

Hall to Enlarge Buffalo Plant

BUFFALO (N Y)—The Hall Aluminum Aircraft Corp, which recently was awarded Navy contracts aggregating $900 000 for the construction of nine all-aluminum flying patrol boats and one air cruiser, announces it will triple the size of its plant in Elmwood Avenue adjoining the various units of the Consolidated Aircraft Corp Charles Ward Hall, president, says that 400 additional mechanics will be employed by the company. The flying boats upon which construction work has been started, will be of duralumin of the bi-plane type with a span of 73 ft Each will be powered with two geared Wright Cyclone The actual cost will be $668-000 The Navy is prohibiting announcement of details concerning the Hall seaplane of the cruiser type to be built

Statistical Data

NEW material further supplementing the statistical issue, AVIATION *March 22, 1930, is given herewith As announced in our April 26 number (which carried the first supplement) such data will appear regularly each month for the use of those who wish to keep the curves and totals up to date Page numbers in the statistical issue are given*

MISCELLANEOUS ACTIVITIES

(Page 571) No of approved flying schools May 15, 1930	30
No of approved airplane designs May 15.	317
No. of approved engine designs May 15	46

EXPORTS

(Page 594-5-6) April export data were published in the June 7 1930 issue page 1139

Cumulative totals for first four months of the year are as follows

No. of aircraft	77
Value of aircraft	$1 244 136
No. of engines	85
Value of engines	$259 745
Value of parts.	$457 079

LICENSING

(Page 561) Periodical Record of Pilots' and Mechanics' Licenses.

Average No of pilots licenses applied for weekly during April.	233
Average No of pilots' licenses applied for weekly during May	222
Average No of mechanics licenses applied for weekly during April	91
Average No of mechanics licenses applied for weekly during May	80
Average No of student permits granted weekly during April	323
Average No. of student permits granted weekly during May	473

We have made arrangements to secure a tabulation of the class of pilots licenses issued Henceforth, this material will be included in the monthly supplement. Data for approximately, the month of May (five weeks) are as follows

New private licenses issued	401
New industrial licenses issued	10
New limited commercial licenses issued	39
New transport licenses issued	145
Changed from limited commercial to transport	110
Changed from industrial to transport	3
Changed from industrial to limited commercial	4
Changed from private to transport	30
Changed from private to limited commercial	171
Changed from private to industrial	1
Lowered from limited commercial to private	13
Lowered from transport to private	3

(Page 560) Periodic Airplane License and Identification Data.

Plane licenses valid May 31, 1930	6 596
Identifications valid May 31, 1930	2,961
Total licenses and identifications.	9 457
(Approximately 400 gliders)	
Ratio of licenses to total licenses and identifications May 31 1930	696
Licenses applied for during March	564
Licenses applied for during April	715
Licenses applied for during May	898
Identifications applied for during March	285
Identifications applied for during April	395
Identifications applied for during May	608

AIR TRANSPORT AND MAIL

(Page 565-6-7) In the next issue will be given April air mail statistics. Cumulative figures for 1930 air mail data to April 30 (four months) are as follows

Total miles scheduled	5 272 153
Total miles flown	4,768 196
Lb mail carried	2,377 177
Amount paid to contractors	$4,638 012
Average weight per scheduled trip, lb	270 1
Average compensation per mile flown	$0 972
Average compensation per lb. carried	$1 946

(Page 576) Contract Air Mail Regularity (Percentage of mileage flown of mileage scheduled) April 1930 94 4%

AIRPORTS

(Page 582) Airport statement as of May 1, 1930

Municipal airports	472
Commercial airports	528
Intermediate fields	296
Government fields (all classes)	82
Auxiliary fields	213
Total number of airports	1 591

FOREIGN AERONAUTICAL ACTIVITIES

(Page 600) Appropriation for Civil Aviation in Rumania, 1930	$228 271
Direct subsidies to Air Transport in Rumania for 1930	$48 000
(Page 604) Statistics of Civil Air Transport Belgium—Production of Civil Aircraft during 1929	140 planes
Denmark—Production of Civil Aircraft during 1929	2 planes
Czechoslovakia—Total number of civil aircraft at the end of 1929	141 planes
Production of civil aircraft in 1929	0 planes
Russia—Length of airlines in operation during 1929	7,439 miles
Passengers carried during 1929 (regular service)	8,996
Lb. of mail and express carried during 1929 (regular service)	503 969
(Page 602 Annual Airplane mileage in Air Transport. Russia (1929	1 403,788 mi

(Page 604) Pilots and airports (Data for 1929 in all cases)

Chile—Civil airports	7
Military fields	3
Hungary—Civil airports	8
Japan—Civil airports	7
Military fields	17
Netherlands—Civil airports	2
Rumania—Civil airports	5
Military fields	7
Emergency fields..	9

(Page 574) Airway and Operation Mileage as of May 31, 1930.

Miles of mail airways	22,087
Total miles of airways	47 016
Airplane miles scheduled daily with mails.	50,433
Total airplane miles scheduled daily	101 914
(Page 578) Percentage of Total Route Mileage on which Mail is Carried May 31 1930	57 8

Schoolboy Gliders Permitted

LOS ANGELES (CALIF)—According to a decision recently announced by John Upjohn, Superintendent of Schools for Los Angeles County, pupils in county schools may construct gliders in the manual training departments of the various schools In order to relieve the school authorities of responsibility in case of accident in connection with the operation of the gliders after they are completed, the pupils are required to form a club, each member of which must have the written consent of his parents, and the school-built glider is then sold to the club by the school. Under this plan it is possible to have the gliders built under strict supervision during school hours, but the actual operation of the gliders, once completed, is entirely divorced from school administration.

Bendix to Enlarge South Bend Plant

SOUTH BEND (IND)—Plans for a huge expansion program were filed today by the Bendix Aviation Corp with the city building commission The plans call for the immediate construction of two factory units at a cost of approximately $500,000 Unit A will be erected in the rear of the Bendix Brake plant and will be approximately 200x400 ft Unit B, already under construction, is 125x700 ft The two units will add about 167,500 sq ft of floor space to the Bendix plants

Two other units are said to be under consideration by the Bendix corporation Tentative plans call for one structure 200x800 ft. and another 300x800 ft Unit B is expected to house the airplane wheel division recently moved here from Dayton The plants are also linked with the recent incorporation of the Bendix Research Corp for the purpose of developing new devices designed by Bendix Several new devices are expected to be placed on the market soon.

More Approvals Issued

WASHINGTON (D C)—Three more plane and three more engine approvals have been given out by the Department of Commerce The planes, according to certificate number, make and designation, type, power plant, weight empty, useful load, and gross weight are No 327—Mono Monocoupe 110, two-place, cabin monoplane, 110 hp Warner 1,020 lb, 600 lb, 1,620 lb; No 328—Bellanca Pacemaker 300W, six-place, cabin monoplane, Wasp Junior, landplane—2,465 lb, 1,835 lb, 4,300 lb, seaplane—2,922 lb, 1,835 lb, 4,757 lb, No 329—Stinson SM-7B, four-place, cabin monoplane, Wasp Junior, 2 312 lb., 1,188 lb, 3 500 lb Approved type engine certificate No. 51 was awarded the Kinner R-440 5-cyl radial, air-cooled, with a rated horsepower of 125 at 1 925 r p m, engine certificate No 52 was awarded the LeBlond 110, 7-cyl, radial, air-cooled with a rated horsepower of 110 at 2,150 r p m, engine certificate No 53 was awarded the Szekely SR 3, 3 cyl radial, air-cooled, with a rated horsepower of 30 at 1,750 r p m

Atlantic Air Service Ends Year

WESTFIELD (N J)—Atlantic Air Service, Inc, has recently completed its first year's operation at its local airport About 50 students have been graduated in that period, and the present active enrollment is 32 Courses leading to Private and Limited Commercial Licenses are offered instruction being given on several types of planes, including Fleet Spartan, and Cessna. Ground school operations are conducted at Newark, at the main offices of the company The officers are C R Dann, president and M D Baldwin, treasurer Flying instruction is given under the direction of C. D Boyer, and W C. Noble

PERSONNEL

ORVILLE WRIGHT was given the degree of Doctor of Laws by Harvard University at the 1930 annual commencement

EDWARD S EVANS, president of Detroit Aircraft Corp, has been elected president of the Detroit Board of Commerce for the coming year.

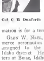
W E Arthur

WILLIAM E. ARTHUR who has been in ... of the airports division of The Austin Co., is now president of the recently organized National Airport Engineering Co Ltd, 775 E Washington St Los Angeles, Calif G H McCLELLAND has been appointed district manager with offices at 1017 Schofield Bldg, Cleveland Ohio He was formerly branch sales manager of Curtiss Wright Flying Service.

LOWELL LAMOREAUX, instructor for Standard Flying Schools has been placed in charge of the new field and school established by the company at Santa Paula Calif

GEORGE F ZIMMER, formerly of U S Naval Aviation, and director of aviation for the Philadelphia Sesquicentennial Exposition has been made public relations manager for International Airports Corp, New York, N Y

LEWIS S CARR formerly of the engineering department of Knoll Aircraft Corp Wichita, Kan, is now field representative for Boeing School of Aeronautics, with headquarters in Chicago



Col C H Danforth

COL CHARLES H DANFORTH commander at Selfridge Field has been nominated for promotion to the rank of Brigadier General and to the position of assistant chief of the Air Corps If confirmed by the Senate, he will succeed Brig Gen WILLIAM E GILLMORE who will retire June 30 with his present rank. Colonel Danforth's nomination is for a term of 4 yr

GLEN W. NEEL, Department of Commerce aeronautics inspector has been assigned to the Montana-Wyoming-Idaho district He will have headquarters at Boise, Idaho

FRED A ROAR has been named district passenger agent at Portland, Ore, for West Coast Air Transport Corp

JAMES NELSON formerly with the Ford Co at Detroit, has been appointed aircraft inspector for Southwest Air Fast Express, Inc, Tulsa, Okla

WILLIAM BURROWS, vice-president of General Electric Co, Schenectady, N Y, on July 1 will replace vice-president CUMMINGS C CHESNEY as chairman of the company's manufacturing committee.

ROBERT PORTER was re elected president of Kinner Airplane & Motor Corp, Glendale, Calif, at the recent annual meeting. Other officers elected or re-elected were, W WARDMAN secretary-treasurer, ROY D BAYLY, first vice-president; B L GRAVES second vice-president W B KINNER ROBERT PORTER ROY D BAYLY PRESTON LOCKWOOD, E L STANTON W WARDMAN, B L GRAVES, directors.

WILEY POST of Lockheed Aircraft Corp, has been made sales manager of Hall-Julian Aircraft Co, Lockheed distributors in Oklahoma.

ROBERT HAMBLETON, recently in the traffic department of Eastern Steamship Co., has been made traffic manager at Boston for Curtiss-Wright Flying Service. He replaces WILLIAM HARRIS, who is to hold the same position at Nantucket during summer operations

G W Orr

G W ORR is now president of Roosevelt Field Inc He succeeds SETH LOW, who has resigned to accept the chairmanship of the board of directors GRAHAM B GROSVENOR vice-chairman of The Aviation Corp has been made chairman of the executive committee for Roosevelt Field, subsidiary of the larger company

DR THEODOR VON KARMAN, formerly professor of aerodynamics at the University of Aachen Germany, and director of the Guggenheim Lighter-than air Institute at Akron, Ohio, has been appointed to the chair of aeronautics at California Institute of Technology Pasadena, Calif Associated with him will be Professors HARRY BATEMAN, ERIC T. BELL PAUL EPSTEIN and assistant professors ARTHUR L KLEIN CLARK B MILLIKAN and ARTHUR E RAYMOND. Professor von Karman will retain his connection with the Institute at Akron

DOUGLAS W CLEPHANE who has been in charge of publicity for Ryan Division of Detroit Aircraft Corp, will hereafter be publicity director for the entire organization

NICHOLAS N SINITSIN, recently head of the stress analysis department, is now general manager of the engineering department of Sikorsky Aviation Corp, Bridgeport Conn, replacing KENNETH D. BLAKE, resigned RICHARD C. EATON has been promoted to the position formerly occupied by Mr Sinitsin

AERONAUTICAL CALENDAR

July 4	National Elimination Balloon Race Houston Tex
July 4-19	New York State Air Tour starting from Buffalo
July 5	English King's Cup Race
July 9-18	Second Michigan Air Tour sponsored by Board of Commerce Pontiac Mich.
July 12-13	International Rally to Liege Belgium
July 20-Aug. 7	International Light Plane Tour starting from Tempelhof Airport Berlin, Germany
July 21	All American Flying Derby starting from Detroit Mich Sponsored by American Cirrus Engines Inc. Marysville Mich
Aug 9-24	International Gliding Meet, auspices Rhoen Rossiten Gesellschaft on Wasserkuppe, East Prussia Germany
Aug. 23-Sept 1	National Air Races Chicago Ill
Sept 1	Gordon Bennett International Balloon Race Cleveland Ohio
Sept. 11-27	National Air Tour starting and ending at Detroit Mich Manager Capt. Ray Collins

EXPOSITIONS

June 28-July 6	Pacific Coast Aeronautical Exposition Oakland Calif Municipal Airport
June 28-July 6	Aviation Show, Oakland Calif sponsored by American Legion Northern California Aero Club and Oakland Chamber of Commerce
July 1-6	Aircraft and Sportsman's Exposition Transcontinental Airport Toledo Ohio
July 6	International Transportation Exposition Warsaw Poland
Sept. 6-8	International Aero Exhibition Stockholm Sweden.
Nov 28-Dec. 14	International Aero Show Grand Palais Paris, France, under the auspices of Chambre Syndicale des Industries Aeronautiques

MEETINGS AND CONFERENCES

July 3-5	Western States Aeronautical Conference Medford Ore.
July 11-12	Aeronautical Chamber of Commerce Western District Meeting, Denver Colo
Aug 18-21	National Legislative Air Conference Levy Mayer Hall of Law Northwestern University Evanston Ill
Aug. 26-28	S.A.E. Aeronautic Meeting, Chicago Ill.
Sept. 1-6	Fifth International Air Congress under the auspices of the Royal Aero Club The Hague Holland

DEDICATIONS AND MEETS

July 4	Cross-country race beginning dedication of Ponca City, Okla with dedication of Ponca City Airport
July 4	Rochester Indiana
July 4	Eureka Springs, Okla
July 4	Kelso Wash Airport.
July 4	Curtiss-Wright Airport Milwaukee Wis.
July 4	Air Races Anderson Ind
July 4-5	Harrisburg, Pa.
July 4-6	Air Meet Lake Placid, N Y under the direction of Lake Placid Flying Service
July 4-6	Dedication and meet, Milford Pa Airport
July 4-6	Chippewa Falls Wis
July 6	Curtiss-Wright Airport, Milwaukee Wis.
Aug 1-2	McGhee Tyson Airport, Knoxville Tenn.
Aug 2-3	Air Meet Danville, Ill.
Aug 9-10	Air Fair Grand Rapids Mich Airport
Sept 1	Wauchula Fla. Airport
Sept. 13-14	Duluth Minn Airport
Sept 13-14	Williamson Johnson Airport, Duluth Minn.
Oct 17 20	Denver Colo Municipal Airport

BRIEFLY

Ford Motor Co will obtain the American rights to manufacture Isotta Fraschini aircraft engines, particularly the 80 hp aircooled model, if negotiations are satisfactorily concluded for building Ford cars in Italy by the Isotta Fraschini company

Yellow Air Cab Mfg Co, Wichita, Kan, has announced plans for immediate production of three types of all-metal, mid-wing planes designed by Kenneth Ronan, former chief engineer for Stinson Aircraft Corp It is reported that they will be two-, four- and six-place, and that the last will be powered with a Packard Diesel engine.

Thirty two Air Corps Reserve officers who took the examination Feb 17 22 have just been commissioned second lieutenants in the Air Corps, Regular Army

The Post Office Department was awarded a gold medal by the Spanish Government for its air mail exhibit at the Seville International Exposition It was designed by Robert B Bryan

Detroit Aircraft Corp has announced a policy of establishing dealers in every city of over 25,000 population, to be selected on the basis of merchandising experience rather than connection with aviation.

Dr Arthur J Cramp director of the Bureau of Investigation of the American Medical Association characterized attempts to relieve deafness due to organic causes by airplane flights as "utter folly" at a recent meeting in New York.

Travel Air Mfg Co has completed a specially designed cotton-dusting plane for Curtiss-Wright Flying Service.

Thirteen seniors at the University of Washington who completed the Naval R.O.T.C. ground school course have been designated to take preliminary flight training at the Naval Air Station at Sand Point, Wash

The Campbell Co San Diego, Calif., is publishing a manual by J V Mumma entitled "Parachutes"

Continental Oil Co, Ponca City Okla, has added a Ford to its present fleet of three planes The new machine has three Wasp engines

Stearman Aircraft Co, has sold its Air Industries Foundry Co Bldg in Wichita, Kan, and will continue the business at the United Aircraft & Transport Corp plant which is being built.

Clarence O Prest, builder of the Prest "Baby Pursuit" monoplane is planning a transcontinental flight and a tour of the east for demonstration purposes

Hegenburger Road soon to be opened will provide a direct route from Oakland City Hall to the Oakland (Calif) Municipal Airport cutting about 15 min from the time required by car at present

Three bombers built by Great Lakes Aircraft Corp have been delivered to the Navy at San Diego, Calif, and the fifteen additional planes contracted for are to be delivered by July 9

E W Whiting is seeking a manufacturer in Fort Worth or Dallas for a biplane powered with a 90 hp inverted Menasco engine

Consolidated Aircraft Corp has delivered a Model 20 type 2 Fleetster combination mail and passenger plane to Western Canada Airways, Ltd, Winnipeg, Man

New Firms Announced

AVIATION SALES AND SERVICE, Minneapolis Minn, by W H Ainsworth and J T Heinrich, to sell aviation supplies and Waco Stinson and Aeronca planes

CLARK AIRPLANE CORP Ponca City, Okla; capital, $50,000 by Richard D Clark Charles D Reed, and George E McPhail to manufacture airplanes

COX & STEVENS AIRCRAFT CORP., New York, N Y, capital stock 500 shares preferred stock of $100 par value, and 100 shares no par value common stock, by Daniel H Cox, Robert D Huntington, Maurice D Shortway, to manufacture and deal in aircraft

MANNCRAFT AIRPLANE Co Collierville, Tenn; capital stock, 2 000 shares preferred stock of $50 par value, and 6 000 shares no par value common stock by H. W Mann, H W Mann, Jr, and Edward C Huffaker, to manufacture buy and sell airplanes

MARINE GLIDER CORP, Marblehead Mass by Dana Jefferson and H H Talbot, to manufacture amphibion gliders

NOVA SCOTIA COMMERCIAL AVIATION Co, LTD, Sydney, N S, capital, $200 000, to transport mail and passengers between the Maritime Provinces Newfoundland, and Upper Canada

WESTFAHL AIRWAYS INC., Milwaukee Wis, capital, $25 000 by Phil C Westfahl, Harold Westfahl, and Arthur Schwates

"Volunteer" Ends Year of Service

LOS ANGELES (CALIF) — Having completed 1 yr of flying throughout Southern California on June 4 the Goodyear blimp "Volunteer" has been made available to the public for sight-seeing trips over downtown Los Angeles or for charter party trips to other sections of Southern California On the new commercial basis the "Volunteer" will carry passengers at $15 per person on the regular sight-seeing trips. During the past year all flying has been confined to student training and experimental flying in order to fully determine the flying conditions for lighter than air craft in this territory during all seasons of the year Lieut. Karl Lange has been in charge of flying during the past year, with B F Campbell as co-pilot During the year six selected students have been trained as dirigible and free balloon pilots, each having had 125 hr or more at the controls

SCHOOLS

AIRTECH SCHOOL OF AVIATION, San Diego, Calif reports the opening of its summer school courses with thirteen new students in the initial enrollment

WADLOW BROS FLYING SERVICE has acquired and is now operating what was formerly Central Air College at Wichita, Kan

UNIVERSAL FLYING SCHOOL, Cleveland Ohio, reports that its planes spent 3,600 hr in the air and 312 students attended the school during its first year, recently completed.

PORTERFIELD FLYING SCHOOL INC, Kansas City Kan is planning to establish schools in various towns in the vicinity of Kansas City Company pilots will make definite circuits of such towns each week to give flying time by appointment

KENNEY FLYING SERVICE, Buffalo N Y, is now conducting the ground and flight training school formerly operated by the Colonial Flying School at the Buffalo Municipal Airport

MONTEZUMA SCHOOL Los Gatos Calif., a private school for boys recently graduated its first aviation ground school class The students were taught by Curtiss Wright instructors and received credits which will be accepted by any Curtiss-Wright unit

Trade Tips

Bids for 150 36-in double ended, revolving beacon lights are to be opened at the office of the division of supplies Department of Commerce, at 2 p.m, July 7 Drawings and specifications may be obtained from the division of supplies upon request accompanied by $5 deposit Further information may be obtained from the Commissioner of Lighthouses, Washington D C Reference is to proposal No 22,133

City Commission of Shreveport, La, is considering bids for construction of an administration building of three stories, for a 100x100 ft hangar with 20x80 ft. lean-to, and for complete lighting equipment Jones Roessle Olschner & Weiner, Ardis Bldg. Shreveport will act as superintendents of construction

N B Additional information concerning trade possibilities will be found in the column headed "Airport Construction Projects"

Representatives Named

DETROIT AIRCRAFT CORP — Air Services, Inc, New York N Y, distributor for New York New Jersey Connecticut and eastern Pennsylvania, Associated Aircraft, Inc, Chicago distributor for Indiana, Illinois, and Florida

BOWLUS SAILPLANES AND GLIDERS — Aero Agents Co, Inc Chicago, distributor for northern Illinois, and northwest Indiana

AIRPORTS AND AIRLINES

New Air Map Waits Decision of Comptroller

WASHINGTON (D. C.)—Announcement of the new air mail map, expected by the operators for the last two weeks, is being held up from day to day awaiting the decision of the Comptroller General as to its legality. No payment for routes flown can be made by the Postmaster General without the approval of the Comptroller. The principal points on which the Comptroller will advise it is believed, are concerned with the contracting for the two new transcontinental routes (New York to Los Angeles via St. Louis, and Atlanta to Los Angeles via Shreveport) and the authorization of lengthy extensions of existing mail runs. A proposed extension of the Eastern Air Express from Atlanta to Dallas on the southern transcontinental falls in the latter class, as detailed in the tentative map printed by AVIATION June 21, page 1236.

In his statements prior to the passage of the Watres bill the Postmaster General expressed his desire to have the authority to make extensions of several hundred miles. The Comptroller General probably will be called upon to state the length an extension may legally be carried. Whether the Postmaster General desires to place mail on existing passenger lines along the routes of the proposed transcontinental lines has not been indicated but it is believed that the Comptroller will insist on these routes being thrown open to bidding.

S.A.T. Baggage Rules Revised

FORT WORTH (TEX.)—Baggage regulations over the Southern Air Transport system have been standardized. Heretofore almost every line had a different policy. Under the new regulations the charge on excess baggage is at the rate of 0.5 per cent of the airway fare per pound. There is no minimum charge. Maximum limits for the various S. A. T. routes are: All Texas routes and Oklahoma City-Tulsa route (or all using planes with single engines) 30 lb.; 30 lb. free allowance and excess 20 lb. On the routes from Dallas to Tulsa and from Tulsa to Kansas City (using tri-engined Fokkers) exceptions to the same maximum limit may be made by special arrangement with the field manager.

Cleveland Dining Concession Let

CLEVELAND (OHIO)—The restaurant and refreshment concession at Cleveland Municipal Airport has been awarded for a three-year period which will bring the city $3,200 per year.

Oklahoma City Traffic Heavy

OKLAHOMA CITY (OKLA.)—Four thousand six hundred and forty-nine passengers passed through the Oklahoma City Municipal Airport during May. Airline tickets sold here during May amounted to $36,027.88.

Form Airport Surfacing And Drainage Committee

WASHINGTON (D. C.)—A committee on airport drainage and surfacing has been formed through the co-operation of the American Engineering Council, the American Road Builders' Association, and the Aeronautics Branch of the Department of Commerce. This is one step in the recently announced program of co-operation between these organizations. It will be the purpose of the committee to provide information for establishing uniform standards for the construction and maintenance of ports.

Chairman of the committee is Harry H. Blee, Director of Aeronautic Development of the Department of Commerce. Other members are A. Pendleton Taliaferro, Jr., chief of the airport section; John E. Sommers, secretary of the American Road Builders' Association; W. A. Van Duzer, president of A.R.B.A.; C. N. Conner, executive engineer of A.R.B.A.; Col. C. E. Myers, President of city officials' division of A.R.B.A. and director of transit, Philadelphia; Henry H. Wilson, of Winston Bros. Co. & H. H. Wilson, Harrisburg, Pa.; Charles M. Upham, executive secretary of manufacturers' division, A.R.B.A.; W. W. Horner, chief engineer, sewers and paving, St. Louis, Mo.; Archibald Black, President, Black & Bigelow, Inc.; Perry A. Fellows, city engineer, Detroit; C. A. Hogentogler, senior highway engineer, Bureau of Public Roads, Washington, D. C.; James H. Polhemus, chief engineer and general manager, Port of Portland, Portland, Ore.

S.W. Airway Progressing

SAN DIEGO (CALIF.)—Intermediate landing fields and beacon light sites along the 650-mi. route from San Diego to El Paso have been selected by L. C. Elliott, Airways Extension Superintendent of the Department of Commerce. Beacons will be at 15-mi. intervals with 36-in lights and the landing fields will be 30 mi. apart. Beacon light sites have been selected and leases signed for them along the San Diego-Los Angeles route said Elliott. These will be 24-in. beacons at 10-mi. intervals. With the exception of one field leases have been signed for intermediate landing fields on this route.

Randolph Field Formally Dedicated

SAN ANTONIO (TEX.)—An aerial review of 235 Army planes from Brooks, Kelly, Dodd, Fort Crockett, Post and March Fields featured the formal dedication of Randolph Field, future headquarters of the Army's flying schools, on June 20-21.

The ceremonies also were marked by presentation of the field which was purchased by the City of San Antonio and donated to the Government to prevent removal of training activities from this city, to Maj. Gen. James E. Fechet, chief of Air Corps, by Mayor C. M. Chambers.

A special demonstration of military flying in connection with the graduation of the June class from the Advanced Flying School, Kelly Field, June 21, was included in the program. Events included an aerial review of 90 planes flown by the graduating students, and acrobatic flying and tactical flying by the Third Attack Group from Fort Crockett.

[A photograph of the tract and a description of the arrangement of buildings, etc., was printed in the March 22 issue of AVIATION.—Ed.]

Traffic Drop Only Slight

CHICAGO (ILL.)—Increases in rates recently announced by the various air transport lines have resulted in a slight decrease in the number of passengers carried, but the net return on ticket sales is greater. That is the experience of the Air Passenger Bureau of Chicago Air Traffic Association, according to Charles E. Beard, manager. Mr. Beard characterized the reduction in the number of passengers as "hardly noticeable." The volume of business transacted by the ticket office in May amounted to $41,000, a new high mark for all time. A business of only $10,800 was done in May 1929. Judging from sales made so far this month, Mr. Beard estimates that the amount taken in by the Air Passenger Bureau will exceed the record set last month by $3,000 or $4,000.

Carried 16,945 Safely in Year

ROOSEVELT FIELD (L. I., N. Y.)—The Roosevelt Flying Corp. carried 16,945 passengers without accident during the year ended April 30, according to its annual report issued recently. Of this number, 1,440 persons were carried in planes from the company's winter base on the outskirts of West Palm Beach, Fla. The heaviest traffic was reported for the month of August, 1929.

Reduce Funds for Air Corps Port Construction

WASHINGTON (D. C.)—Instead of an appropriation of $11,447,962 for construction projects at Army Air Corps fields as recommended by Maj.-Gen. Fechet, the House Military Affairs Committee has approved a modified bill in which the amount for construction is only $4,370,019. This is expected to pass the House of Representatives during the current session of Congress, but pressure of last-minute legislation may prevent its consideration in the Senate.

Allocation of the amount as proposed is as follows: Barksdale Field, Shreveport, La., $462,000, of which $170,000 is for hangars and $115,000 for grading; Bolling Field, District of Columbia, $244,000; Brooks Field, San Antonio, Tex., $63,000 (provided that $206,000 authorized for Fort Sam Houston is canceled); Duncan Field, San Antonio, Tex., $372,000; Fairfield (Ohio) Air Depot, $109,000; Langley Field, Hampton, Va., $480,902; Fort Leavenworth, Kan., $12,595; March Field, Riverside, Calif., $5,000; Maxwell Field, Montgomery, Ala., $19,000; Mitchel Field, Long Island, N. Y., $304,504; Randolph Field, San Antonio, Tex., $641,000; Middletown (Pa.) Air Depot, $55,000; Selfridge Field, Mount Clemens, Mich., $389,000; Wheeler Field, Hawaii, $436,000; Alborrk Field, Canal Zone, $380,000; France Field, Canal Zone, $385,000; Dallas, Tex., $5,000; Fort Bliss, Tex., $1,654; Hatbox Field, Muskogee, Okla., $5,000.

The Air Corps is making strenuous efforts to improve its housing.

Form New Air Travel Bureau

NEW YORK (N. Y.)—International Airports Corp. has established a traffic department for air travel, which is prepared to furnish information and to provide tickets and reservations for all airlines in North and South America. The new department will also arrange all types of charter trips which may be desired. Plans are now being made for world-wide dissemination of air travel information through co-operation between International Airports Corp. and an international telegraph and cable company.

Toledo Municipal Port May Close

TOLEDO (OHIO)—The municipal airport is expected to close June 30, as the mayor has vetoed legislation for renewal of lease on the field. This temporary field has shown a loss of $28,000 since it was opened in 1927. The Curtiss-Wright Flying Service base here, which has an $80,000 hangar and twelve planes, is also being closed out. It is under the management of Walter E. Allen. The city will not be without an airport, as Transcontinental Airport, Inc., maintains a field.

Name Three More Entry Ports

WASHINGTON (D. C.)—The flying fields at Port Townsend, Mich., Juneau, Alaska, and Ketchikan, Alaska, have been designated temporary airports of entry for one year, according to an announcement by Assistant Secretary of the Treasury, Seymour Lowman.

Varney Line Extends Its Passenger Service

PORTLAND (ORE.)—Early in July, Varney Air Lines will provide passenger service over its Portland-Tacoma-Seattle and Spokane-Pasco mail routes. Passenger service on the Portland-Salt Lake City line was inaugurated May 15. Connections are made with the Boeing System at Salt Lake City, and with the addition of the new passenger routes, through service to Chicago will be provided from most of the important cities in the Northwest.

Passengers will be carried on the regular mail schedule. Planes leave Seattle at 3:40 p.m. and Tacoma at 4 p.m. daily. Another section will leave Spokane at 5:45 p.m. daily. Connection will be made with Boeing at Salt Lake City at 2 a.m., so that passengers may reach Chicago the following evening at 6 p.m. Westbound planes will leave Salt Lake City at 10 p.m., arriving in Spokane at 4:15 a.m., Tacoma at 7:35 a.m., and Seattle at 7:50 a.m. Boeing planes are used.

New Delta Line Joins Atlanta and Fort Worth

ATLANTA (GA.)—Through service between Atlanta and Fort Worth has recently been inaugurated by Delta Air Lines, Inc. Rates on the service will be computed on the basis of $.07 a mile, it has been announced, making the fare between Atlanta and Birmingham $9.94. The airline distance from Atlanta to Birmingham is about 142 mi., and from Birmingham to Fort Worth 600 mi.

J. S. Fox is traffic manager for the company, which will be represented in Atlanta by Lee Sanders, divisional manager for Gulf Coast Airways. The Gulf Coast hangar at Candler Field here will be used for storage of planes until the Delta company can provide its own facilities. The schedule:

Lv 8:00 a.m.	Atlanta	Arr	6:00 p.m.
Arr 9:30 a.m.	Birmingham	Arr	4:30 a.m.
Arr 3:45 p.m.	Fort Worth	Lv	8:00 a.m.

Alaska-Wash. Line Carries 1,517

SEATTLE (WASH.)—A total of 1,517 passengers were carried in Alaska-Washington Airways planes during May, according to its traffic department. On the Seattle-Victoria-Vancouver division 1,162 passengers were carried; 239 passengers were carried on the Alaskan division and 112 on the eastern Washington line.

Postpone Decision On Naval Airship Base

WASHINGTON (D. C.)—Action on the proposed west coast naval dirigible base has been postponed until the December session of Congress, by a vote of eleven to eight in the House naval affairs committee. It is therefore considered improbable that the question will be decided before the next regular session in December, 1931, as it is not likely to be thought sufficiently important for action during the short session. In the meantime the membership of the committee is certain to change somewhat and it is therefore impossible to make any prediction as to the probable decision. New hearings may be held, which would alter the impression of the hearings during the past four weeks.

The report of the war plans division of the Bureau of Naval Operations was opposed to the erection of a dirigible hangar anywhere on the Pacific coast, holding that a site on the Atlantic is more suitable for experimental maneuvers, and that the Hawaiian Islands would be more desirable from a strictly strategic point of view. The report further stated that a new hangar is not strictly necessary at this time, since there is room for two airships at Lakehurst, and the Los Angeles will be decommissioned as soon as the first of the new Navy dirigibles is completed. Opposition is developing to further appropriations for airship construction in the immediate future, and it is thus quite possible that the whole project of a new base may be abandoned. The report recommends, however, that if a Pacific coast site should be chosen, it be in the vicinity of Mare Island (Sunnyvale).

Universal Changes Schedules

CLEVELAND (OHIO)—Universal Air Lines, division of American Airways, has added a second Cleveland-Chicago passenger trip, departing from Cleveland at 1:15 p.m. (ET) and arriving Chicago at 3:00 p.m. (CT). Returning the plane leaves Chicago at 3:45 p.m. (CT), arriving Cleveland at 7:05 p.m. (ET). Universal also has inaugurated an additional service between Chicago and St. Louis. Departure from St. Louis is at 1:45 p.m. with arrival in Chicago at 3:55 p.m. From Chicago the plane leaves at 5 p.m., arriving St. Louis at 7:25 p.m.

Northwest Gets Letter of Authority

MINNEAPOLIS (MINN.)—A Letter of Authority from the Department of Commerce has been granted Northwest Airways, according to word received here by A. R. Rogers, chairman of the board of the airline, from Col. L. H. Brittin, vice-president and general manager, who was in Washington when the authority was granted. This is the temporary authority issued a company upon application and pending federal inspection of the entire service at a later date.

AIRPORT CONSTRUCTION PROJECTS

West

THE Pierce County Airport, Tacoma, Wash, which is nearing completion, comprises 940 acres, of which 400 acres will be used for industrial sites, and 100 acres for a public park and playground. It provides a 3000-ft all-way field and a northeast-southwest runway 5,400 ft long. Improvements include a 110x210-ft hangar, lighting equipment, fire protection equipment, and the development of a hydroplane basin with a 2000-ft. runway and minimum depth of 6 ft. is planned, and a hangar to house twelve gliders is to be provided later. The port is owned and operated by the county, under the supervision of Libbey Wilkeson

Work on the California Flying Club building at Grand Central Air Terminal Glendale, is nearly complete Opening and dedication are planned for July 4 The $100,000 building contains hangars for private planes, dining room, club rooms, and a private garage

The Wenatchee (Wash) Chamber of Commerce has voted an appropriation of $10000 for improvements at Fancher Field the municipal airport The installation of runways in six directions beacon lights grading oiling, and construction work are projected

The harbor commission of San Diego, has approved plans for a two-story administration building for Lindbergh Field. Work is to be started immediately on construction of radio beacon at the field

Two new hangars have recently been completed at the Los Angeles Municipal Airport Each measures 130 x 200 ft and is built of concrete, steel and hollow tile

The Denver Municipal Airport is be ing improved by the planting of a lawn, trees, shrubbery and flower beds Cement sidewalks are also being laid

A new fueling unit is being installed at the San Jose (Calif.) Airport It is planned to improve the lighting equipment as soon as funds are available

Floodlights are being installed at the Chehalis (Wash) airport, and it is planned to add a teletype station soon

Earle Ovington Santa Barbara, contemplates erecting a hangar on his Casa Loma property it is reported

South

Bids are about to be opened by Capt A. W. Parker Construction Quartermaster at Randolph Field, San Antonio, for a $160000 academic building, of which Ralph Cameron of San Antonio, Tex., is the architect; a $220000 administration building, of which Atlee B and Robert M Ayres, of San Antonio, are architects; and for an operations building and parachute building, to cost about $52000 and Air Corps shops building to cost about $200000 of which Henry T Phelps of San Antonio, is architect The W. E. Simpson Co. also of San Antonio, is the engineer

The Wedell-Williams Air Service Inc., New Orleans, has let the contract to the Arch Construction Co of Louisiana, for construction of 100x100-ft. hangar, with 20-ft lean to, at Jefferson Parish Airport

A runway, 150x2500 ft., running northwest and southeast is being constructed at the Marshall (Tex.) Airport A connecting road, three-quarters of a mile long, will be built from the Jefferson Highway to the airport at once

Installation of lights and the preparation of parking space are underway at the Hattiesburg (Miss) Municipal Airport Grading was completed some time ago and grass is reported to be up on the field

The Commissioners of Roads and Revenues of Glynn County, Ga, at Brunswick have authorized the purchase of a site for an airport to be developed jointly by the city and county

The Fort Worth City Council has authorized the purchase of six new automatic doors for the large hangar at the municipal airport The doors will cost $11,500

The Greenville (S C) Airport Commission has placed a contract with the Sperry Gyroscope Co for complete lighting equipment The field has recently been graded

The terminal building at English Field Amarillo Tex, has been enlarged by an additional story, which will be used by field employees of Western Air Express

A 1600x400-ft runway is under construction at the St Augustine (Fla) Airport A hangar has recently been completed

The Chamber of Commerce of High Point, N C, is reported to be laying plans for establishment of a municipal airport

Pope Field, Fayetteville, N. C., is being equipped with lights

Central

A $75000 National Guard hangar will be built at St. Louis Municipal Airport soon The present hangar will then be taken over by the Robertson Airplane Service Co, which plans to convert it into a passenger depot for T A T-Maddux

The flying field at Merrill, Ia operated by L. C. Schroeder is being extensively improved and two 1,000-watt floodlights are being installed

A new $40000 brick, steel and glass hangar at the Paul Baer Municipal Airport, Fort Wayne, Ind is expected to be ready for use early in July The hangar has a front door measuring 100 x 20 ft, and two side doors each 50 x 14 ft. It includes machine shops, locker rooms, lounging room for pilots, quarters for a resident inspector and a room for school purposes An amplification system for broadcasting announcements and directing crowds at the field has recently been installed by the Hill Radio Co

Work on the Council Bluffs (Ia) Municipal Airport is expected to be resumed soon as a result of a contract between the city and a Des Moines bond house, which will purchase the airport certificates. Failure of the contractors to sell the certificates issued last April resulted in their suspending work on the new $80000 port

A 4-mo construction program has been planned for Wright Field, Dayton, Ohio The radio laboratory, wood shop and wind tunnel are to be enlarged, and a garage, an armament laboratory, and an oil house will be built The buildings are to be one story high, and to be constructed of brick and steel

Six floodlights were recently installed at Curtiss-Steinberg Airport, St Louis, to supplement the 4000000-cp Sperry flood now in use

East

The Utica (N Y) Common Council has voted to table a proposed ordinance for the construction of a $5000 concession stand at the municipal airport. Approval has been voted on the recent auction by the commissioner of public works of concession privileges for $2,100

A circle of ground feldspar has been installed at the Concord (N H.) Airport

More than 350 acres have been cleared at the new Rhode Island Airport at Hillsgeove

The M H Mann Flying Service, Mount Morris, N Y, has plans under way to develop and operate a modern airport on property recently acquired. Plans provide for the erection of a three plane hangar, the installation of runways and a complete illuminating system

The north-south runway at the Danbury (Conn) Airport has been extended 1,000 ft, and a house which obstructed flying has been removed

Aeronautical Radio Gets Operating Permit

FORT WORTH (TEX)—Operation of short-wave radio stations in Texas and Louisiana cities by Aeronautical Radio, Inc., new subsidiary of the Aviation Corp has been authorized by the Federal Radio Commission. The permit covers operation of the company network already developed by Southern Air Transport, and now consisting of short wave stations at Fort Worth, general headquarters, Dallas, operating headquarters, Waco, San Antonio, El Paso, Houston and New Orleans

The authorization was in the form of approval of an application for the voluntary assignment of the radio license held by Southern Air Transport Flying Service to the new subsidiary. S A. T. has a complete wireless telegraph personnel It will permit, officials of S A. T here say, the transaction of company business by radio, the dispatching of planes and the broadcasting of weather reports to planes in the air Some of the larger S A T and American Airways planes will be equipped with radio installations at once, it was added

Airway Briefs

The State of Virginia is offering the services of its engineers and the use of equipment at cost to cities and towns constructing airports. There are 34 fields now under construction in the state

Pan American Airways Corp has been granted a new mail contract by the Government of the Bahama Islands, and will resume service between Miami and Nassau immediately, on a weekly schedule.

Effective June 15, T A T-Maddux Air Lines offered a reduction of 5 per cent for round trip tickets between Los Angeles and San Francisco, bringing the total down to $40 85. Similar reductions are in effect between Los Angeles and San Diego, Fresno, or Bakersfield

Operation of Government weather reporting service at Lindbergh Field. San Diego, Calif, is expected to begin July 1.

Oklahoma Short Line Airways has inaugurated evening excursion flights from Tulsa Municipal Airport Ryan planes are used, and the charge is $5 per person

California Railroad Commission has granted Joe Ferrant a certificate of public convenience and necessity for operation of bus service connecting San Francisco with Alameda Airport, Oakland Municipal Airport, and points in Oakland.

A floodlight system has been installed at the Curtiss-Wright Airport, Valley Stream, L I The main unit is a Sperry AGA 1000 m m. high intensity arc type, and there are two auxiliary floodlights of Sperry AGA 500 m m incandescent type

The site recommended for the Winnipeg Airport has received official approval, and approximately $500,000 will be spent on its development, according to reports.

The Pennsylvania Railroad has placed a through Pullman car for Baltimore and Washington on the Cincinnati Limited leaving Port Columbus at 7:23 p m, for the convenience of T A T-Maddux passengers bound for those cities.

Midcontinent Air Express has inaugurated special excursion and scenic flights to points within a 100-mi. radius of Denver, Colo. Fokker Super-Universal planes are used

Varney Air Lines reports a mileage performance record 99·7 per cent perfect for May, with 103,329 mi. completed of 103,620 scheduled.

Lockport Flying Service, Inc, will open a new airport at Lockport, N. Y, June 28-29.

S.A.F.E. has added one plane a day to its Kansas City-Dallas service, arriving at Kansas City daily at 12:40 p m and leaving at 1 15

Among other airports which have recently applied to the Department of Commerce for A1A rating is that at Ponca City, Okla

During May, 10,212 passengers were cleared in and out of Tulsa (Okla.) Municipal Airport. A check-up showed that many of these were salesmen and that automobile salesmen and factory representatives led the others.

Boeing Aircraft of Canada, Ltd., has purchased nine acres of waterfront property near the business district of Vancouver, B. C., as a base for seaplane operations and as a future plant site.

Steven Olive and John Langley have opened a general aircraft repair and maintenance shop at Los Angeles Metropolitan Airport.

Mail Flown More Than 23,760,000 Mi.

WASHINGTON (D. C.)—Since the inauguration of contract air mail in February, 1926, planes in this service have been flown 23,760,017 mi., according to a report recently made public by the Post Office Department This includes statistics up to May of this year. The total weight of mail carried was 10,350,322 lb, and $21,293,657 06 has been paid to contractors The Chicago-San Francisco route, which is the longest, and which was established July 1, 1927, leads in totals of miles flown, weight of mails dispatched, and amounts paid to contractor

Little Rock Port Still Uncertain

LITTLE ROCK (ARK)—City officials are considering a proposal to sub-lease the landing field of the U. S. Intermediate Air Depot near here, for development as a municipal airport Mayor Robinson has secured approval from the War Department, and the plan under consideration is to pay a rental of $250 per month to White Bros, the present lessees with an agreement that the city shall maintain the field in good condition and erect hangars White Bros obtained their lease May 19, on a bid of $200 per month for 5 yr An alternate possibility is provided by an offer of 900 acres of suitable land about 10 mi from the center of the city at a price of $90 per acre Proceeds from a $200-000 bond issue will be available when the airport site is definitely selected.

Shell Builds Field Trucks

HOUSTON (TEX)—Shell Petroleum Co has fitted up a fleet of six two-ton trucks as portable, super-service stations to bring complete service to planes on the field The number of trucks will be increased with the demand

Gorst Ends First Year of Ferry Line

SEATTLE (WASH) — Gorst Air Transport, operators of the Seattle-Bremerton Air Ferry, has completed its first year of operation, carrying more than 25,000 passengers in the 2700 round trips made. The route is 15 mi. Miles flown total about 100,000

One Keystone-Loening has been flown over the entire Pacific Coast, from Southern California to the Aleutians, covering 83430 miles, and carrying 14,152 passengers All activities of the Gorst company are now centered in one floating headquarters, moored off the end of Pier 3 The structure contains a hangar for five planes, a passenger waiting room, two repair and machine shops a stock room, and a five-room apartment.

Gorst Air Transport is an independent company, with Vern C. Gorst, president Ralph Siegner, vice-president, Clayton L. Scott, vice-president and general manager, and Robert L. Biggs, traffic manager.

Airport Dedications

A NEW 120-ACRE airport at Kewanee, Ill, was formally dedicated June 14 and 15, with fifty planes participating and approximately 10000 people present The port, which cost $60000, has an eight-plane $12,000 hangar, beacon and flood lights, and lies on the projected Kansas City-Chicago radio range beacon route

Other recent airport dedications

June 6, Gulfport (Miss.) Municipal Airport; Brantford (Ont.) Municipal Airport.

June 7-8, Marion, Ohio

June 8, Napoleon, Ohio.

June 11, Niles (Mich.) Municipal Airport; Malad, Ida.

June 15, Union Airport, Lincoln, Neb, Poterfield Airport, Lebanon, Tenn

June 17, Clarksville, Tenn.

June 21 22, Arkoma Airways Corp Airport, Bentonville, Ark.

Okla. City Project Hits Snag

OKLAHOMA CITY (OKLA.)—J H. Schmoldt, bond buyer, filed suit in district court here yesterday seeking an injunction against the sale of Oklahoma City's $425000 airport bond issue. The suit charges that, notwithstanding the recent approval of these bonds by the attorney-general of Oklahoma, the securities are null and void because the state constitution does not provide for airport bonds and because an airport is not a public utility within the meaning of State laws

Northern Aircraft Extends Line

DETROIT (MICH)—Northern Aircraft Corp operator of daily passenger service between Detroit and Bay City, Mich., have extended its service northward to Sault Ste. Marie, Mich.

FOREIGN ACTIVITIES

Entrants in Light Plane Tour Total 98

Germany Leads with 47; France, Poland, Spain Next

BERLIN (GERMANY) — According to the official announcement by *Aero Club von Deutschland*, the final entry list for this year's International Light Plane Tour consists of 98 nominations Of these, 47 are German, 16 French, 14 Polish, 9 Spanish, 8 English and 4 Swiss While in most cases the planes entered are made in the countries nominating them, there are some exceptions. Three DeHavilland Moths are entered by Spain and two by Germany. The only American plane which will compete, a Mono Special, was entered by Maxwell D French of England Regret was expressed because no other American planes were entered, as well as because no American organization is participating

Klemm and B.F.W. Lead Entries

Klemm and B.F.W. lead in number of planes entered, with thirteen each. There are nine DeHavilland Moths and one Morane-Saulnier Moth. Six entrants are Polish R W D, and there are four each of Junkers, Phoenix, Arado, Caudron, and P W S. There will be twenty German Argus engines, eighteen Gipsy, twelve Siemens & Halske, eleven Salmson, nine Cirrus, eight Renault, and seven Genet.

The pilots who captured the first four places last year are all re-entered Morzik, the winner, will again fly a B F W. plane, this year with the new Argus light engine Capt Hubert Broad, who made the fastest time before in a Moth, will attempt to repeat Lord Carbery, who placed third in a Raab Katzenstein, is to pilot the lone American contestant, a Mono Special with 110 hp Warner engine Lusser, who was fourth in a Klemm, will use the same machine, but with an 80-100 hp Argus engine Other well-known pilots entered are Oskar Dinort, the Hon. Lady Bailey Miss Winifred Spooner, Marcel Doret, M, Delmotte, and Mlle. Hilsz.

Tour Scheduled July 20-31

As previously announced the tour will take place July 20-31, and will cover a distance of approximately 4 660 mi, with 28 compulsory stops. Planes completing the tour will be eligible for the efficiency tests to be conducted at Staaken Airport, Berlin, Aug 1-7. Final ratings will be determined in accordance with rules published in AVIATION March 15.

Revise English Air Mail Rates

LONDON (ENGLAND)—Since June 2, air mail postage to European countries is at a flat rate of fourpence ($.08) for the first ounce and threepence ($.06) for each additional ounce This replaces the more complicated surcharge system in force heretofore Countries to which air mail may be sent for this charge are Austria, Belgium, Czechoslovakia, Denmark, Finland, France, Germany, Greece, Holland, Hungary, Italy, Norway, Poland, Russia, Sweden, Switzerland

French Companies Announce Plane Prices

PARIS (FRANCE)—As a result of the recently announced subsidies for private purchasers of planes, French manufacturers are beginning to announce definite prices for their various models Heretofore, planes have been built almost entirely to special order, and even now in most cases delivery can only be made after two or three months Societe Generale Aeronautique is offering the Hanriot 410, with 110 hp. Lorraine engine, for $4 430, to be paid $1 120 with order, a similar amount on delivery, and the balance in twelve monthly installments.

Farman has put prices on three models The F 190 four-place cabin monoplane with 230 hp Salmson or Titan engine sells for about $8 100, and the purchaser would receive a premium of about $2 350 from the Air Ministry. The F.200 two-place plane with 120 hp Salmson engine is $4,120, with subsidy of $1 370 to $1,570 The F.230, a new model low-wing monoplane, sells for $1,765 with 40 hp Salmson engine and about $2 160 with 95 hp Renault engine. For the latter the Air Ministry premium is about $980

Start Liverpool-London Line

LONDON (ENGLAND)—Imperial Airways, Ltd., started a three months' experimental passenger service between Liverpool, Manchester, Birmingham and London on June 16 This connects with the company's London Paris line, and is intended primarily for travelers to and from the Continent, as otherwise it is not expected that planes could compete with the unusually fast rail service between these cities Fares to London are from Liverpool $15, from Manchester, $14 75 and from Birmingham, $7 50, with a 5 per cent reduction for round trip tickets The three cities have each given $4,840 to support the new service during the trial period.

German Air Budget For 1930 is $11,000,000

BERLIN (GERMANY)—As reported to the Reichstag, the German aviation budget for 1930 is approximately $11,-000,000 This represents an increase of about $1,715 000 over the total in the account for 1929 While it is probable that the figure for this year may be reduced somewhat when the various items come up for debate, it is expected that the recommendations will be left substantially intact, and it is practically certain that some increase over last year's figures will be voted

Subsidy to Deutsche Luft Hansa is to be $4,550 000, as compared with about $3,110,000 in 1929 This recommendation includes an item of nearly $750 000 for development of non-European routes which was not included before. The other most notable change in the budget is that in place of last year's appropriation of about $3,500 000 for technical developments, the new budget recommends $1 275 000 for specific technical developments, $28 750 for aviation shows, etc, and $1,650 000 for "economic and to the German aircraft industry" The appropriation for maintenance of the "Deutsche Versuchsanstalt fur Luftfahrt" is to be $384,000, as before.

Ask $755,000 for Zeppelin Hangar

Expenses for salaries and administration are to be reduced from $390,000 to $375 000 This section includes appropriations for maintaining the flight telegraphic service, which are slightly increased A sum of $550,000, the same as last year, is recommended for pilot training. The amount for airway lighting is increased from about $790 000 to $885 000 Special items, which are not to be considered as part of the regular annual expenditures, total $1 450,000, as compared with $700,000 last year The most important of these are $755,000 for completing a Zeppelin hangar, and $480 000 toward retiring loans made by Deutsche Luft Hansa.

British Irvin Co. Has New Chute

LONDON (ENGLAND) — "Caterpillar" is the name given to a new parachute for private pilots which has been developed by Irvin Air Chute of Great Britain, Ltd., and will soon be put into production. Like the standard Irvin parachute, the new model is all silk, and it is said to have a slower rate of descent One of its features is a special pack which can be permanently attached in the cockpit, so that the pilot merely needs to place the straps in place when he climbs into the plane The price of the new air chute is slightly under $300

Foreign Briefs

A sum of about $1,600 left over from subscriptions for a medal presented to Santos Dumont at the recent F A I meeting in Paris will, at his request be used to provide medals to be awarded annually for outstanding achievement in the development of international communication by air

Mileages over French airlines yearly since 1920 have recently been announced as follows 1920, 530,623 1921, 1 462-365, 1922, 1 738,820 1923 2 238 975 1924, 2 266 649, 1925 2 928,448, 1926, 3 243 914, 1927, 3 746,069, 1928 4,534-139, 1929, 5,862,895

In addition to the air-rail service recently announced, Compagnie Internationale de Navigation Aerienne has established an all air line called "Fleche d'Orient" between Paris and Bucharest, covering the distance in 15½ hr. eastbound and 11 hr. westbound, with 8½ hr service between Paris and Vienna

Moteurs Lorraine is now building on a production basis ten types of water-cooled engines and eight types of air-cooled engines, ranging from 100 to 700 hp The company is developing a new inverted racing engine

When she recently failed to recapture the women's endurance record from Mlle. Lena Bernstein, Mlle Maryse Bastie did set a new International Record of 22 hr for single-place light planes She was forced down by trouble with the gasoline feed

Compagnie Air Orient has inaugurated a new 48-hr schedule on its Marseilles-Bagdad air mail line

Relative times for journeys by rail and by air were published as follows by the *Journal de l'Aviation Francaise* Paris-Berlin, 16 and 7 hr ; Paris-Amsterdam, 7 and 3 hr ; Paris-Frankfort 14 and 4 hr ; Paris-Copenhagen, 31 and 9½ hr ; Paris-Hamburg, 18 and 6½ hr

Avions Henry Potez, Meaulte France, has purchased the Anzani Company and taken over operation of the Anzani factory.

While no design for a new British airship is at present being made, a technical staff has been employed to investigate possible improvements in the design of R 100, and to decide what modifications would be necessary in the design if it were applied to a larger airship

A variable density tunnel with an internal diameter of 17 ft has been constructed at the National Physical Laboratory, Teddington, England for use in connections with experiments on high-speed flying

A Royal Air Force pilot recently made five successful fog landings in succession with the aid of a balloon mooced above the airport and a weight suspended below his plane connected with an electric signal on the dash

A Fiat plane with naphtha-driven engine was demonstrated at a recent air pageant at Rome There was also a demonstration of the D'Ascanio helicopter a machine with two sets of revolving wings and three propellers, which is said to have reached a height of 60 ft.

On March 31, 1930, there were in force in Austria 301 private and 177 commercial pilots' licenses, 258 mechanics' licenses, and 35 commercial and private airport licenses. Airplanes registered numbered 226

On June 15, Robert Kronfeld covered 70 mi in a glider between Itford Hill, Sussex, and Portsmouth England He participated in the gliding exhibition at Itford Hill June 7, when Capt L Needham, R.A.F., remained aloft for 20 min in a primary glider

Col Gustavo Leon of the Mexican Air Force has been commissioned to organize and command a second air regiment, which will be equipped with 32 planes

W G Tschudin, an official of the Sinclair Oil Corp of Mexico City, has flown 37 612 mi in Mexico in the past five years

There are now 30 airports in service in the Mexican state of Sonora, and two more are being built at Pilares de Teras and Bavispe

The Mexican line C A T., completed 1,000 000 mi of flying June 3 The company has announced reductions averaging 35 per cent in passenger fares A new waiting room, superintendent's office and other facilities have been constructed at the Torreon airport

A government seaplane base is to be established at Payo Obispo Territory of Quintana Roo, for use in aerial patrol of the Mexican coast as far as the border of British Honduras

The Mexican Ministry of War and Marine has purchased 50 parachutes from an American firm for use by cadets and instructors in the School of Applied Aeronautics

A three-engined Lasconder monoplane, built by Larkin Aerial Services, Inc, is being used for mapping in central Australia, with a base at Ilbilba

The Australian Government has declined proposals made by K N I L.M. for extension of the Amsterdam-Batavia air mail line to Sydney

It is reported that a flying school for civil pilots has been opened in Moscow.

Airports on the Soviet Rukhlovo Yakutsk line are nearing completion and service will be inaugurated soon with eight-passenger planes of Russian design

The Manchurian Supreme War Council has appropriated $450,000 for construction of airports at Harbin, Fuchin, and Pogranichnaya

An aviation museum is to be inaugurated in the aeronautics department of the Mexican Ministry of War and Marine Sept 16, in connection with the celebration of Mexico's independence day.

Plans are being considered which call for the expenditure of over half a million dollars for development of airports, radio and meteorological stations in Siam At first airports would be built at Bisanulok, Don Mnang Bhuket, and Songkhla. Subsidy would be provided for a Siamese air line

Fierro Sets N. Y.-Mexico Mark

MEXICO CITY (MEX.)—Col Roberto Fierro, Mexican Army flier, and his mechanic, Arnulfo Cortes, completed a non-stop flight from Roosevelt Field, New York, June 21, in approximately sixteen hours and a half Flying a Wasp powered Lockheed Sirius, christened the Anahuac, the fliers landed at Valbuena Field at 7 p.m. (Eastern Daylight Saving Time), having covered nearly 2,200 mi, at an average speed estimated to have been 140 m.p.h. Fuel consumption amounted to about 30 gal, per hour The route taken by Colonel Fierro was virtually the same as that followed by Col Charles A. Lindbergh on his non-stop to this city from Washington, D C, in December, 1927, when he set a record of 27 hr, 10 min Save for a storm encountered after leaving Brownsville, Tex, the aviators reported good weather en route

Test Bleriot Distance Plane

BUC (FRANCE)—Lucien Bossoutrot is conducting extensive tests of the new long-distance Bleriot high-wing monoplane, designed by M Zapata The wing, of fairly thick section, has a span of 87 ft, and is braced only by two wires on each side The oval fuselage is carefully streamlined, behind the water cooled Hispano-Suiza engine With a weight empty of 5,720 lb, the machine is designed to carry 15,400 lb of fuel, giving a range of 7,450 mi at 125 m.p.h Total weight loaded is 22,200 lb When the tests are concluded, it will probably be used in an attempt to set new non-stop records.

Mexico Voids Airline Contracts

MEXICO CITY (MEXICO) — Concessions for three airlines have been cancelled by the Mexican Government on the grounds that the concessionaires have failed to fulfill their agreements. Those cancelled are Pedro Chapa and Associates, for a line between Mexico City, Nuevo Laredo, and the American border; Carlos Alarcon, Mexico City-Ciudad Juarez; A F Zambrano, Mexico City Pachuca-Tuxpan-Tampico.

Mexico to Build Military Planes

MEXICO CITY (MEXICO)—The Ministry of War and Marine has announced that 46 military planes are to be built here, similar in general type to the Vought Corsair It is expected that construction will begin as soon as Gen. Juan F Azcarate, chief of the department of aeronautics, returns from the United States

WHAT OUR *Readers Say*

Low Flying Nuisances

TO THE EDITOR

I read with interest your editorials in AVIATION and appreciate your conscientious attempt to guide the industry as it proceeds to develop

The matter that I am bringing to your attention herein is not a new one and probably has been presented by your heretofore, but it seems to me very important and in my opinion too much stress can not be paid to it.

With all the room that there is in the air, why is it that pilots will persist in flying along above the house tops? My friends and people that I meet that know of my interest in aviation are constantly complaining and commenting on the nuisance of motors roaring over their heads They even make the claim that their houses and the contents are shaken thereby. The east is still experiencing a great deal of difficulty in becoming air-minded and while people are still nervous and apprehensive about flying and airplanes it would seem to me over important for them to keep up in the air where there is plenty of room and where they will not bother the people Unquestionably there are days when the ceiling is low that planes have to fly at a low altitude, but in the absence of this condition I can see no excuse for the low flying that goes on every day

I am doing all I can at the local Airport to impress upon pilots here the importance of this suggestion I am sure that you concur with me and hope that you will do all that you can to encourage high flying

W PARKER SEELEY
Bridgeport Airport
Bridgeport, Conn

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Airplane Ports and Airships

TO THE EDITOR

Some day, perhaps soon, we will read of an airplane pilot who was flying around in a misty soup and supposedly (he has not landed yet) saw clearer air ahead about where the strange airport shown on his map should be.

Only what he took for clearer air was a light colored wall seven hundred feet long and a hundred feet high

And then it was too late and too bad. The details followed in the paper The $4 000 000 airship a total loss, many people killed by the resultant explosion and fire, and the pilots license cancelled if he ever lands

Then, perhaps, we will see an end to the many sketches and proposed airport designs showing many airplanes flying around an airport, where a mooring mast a hundred and fifty feet high stands in the middle And moored to this mast is a large airship, serenely floating over a quarter of the airports length

The rules for planes approaching the R-100 on it's visit to the St Hubert Airport at Montreal, as noted in AVIATION, May 31, 1930, Page 1098, give a practical idea of how far away from an airship port an airplane should stay.

True, we have few airships, but we want to keep all of them flying and for their safety and the safety of the airplanes, keep them off the airports, present and projected. And the public should not be educated along impractical lines.

Airships should have separate landing areas which are reserved for them and over which planes are prohibited to fly below specified heights

For even though the sketches indicate bright, clear days, there are many misty days and soupy nights when the planes must fly

ROBERT S SMILIE
San Francisco, Calif

[In principle we quite agree with Mr Smilie Most of the sketches to which he refers have remained sketches projects of the imagination rather than of actual execution While the mistaking of an airship for a hole in a fog as suggested by Mr Smilie may not be absolutely impossible it seems to us rather unlikely that it would ever happen However, there are plenty of other reasons for preferring to keep intensive airship and airplane operation well separated from each other —Ed]

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Flying Instruction

TO THE EDITOR

In a recent issue of AVIATION [April 12, 1930] I read with much feeling and understanding an editorial on the gentle art of teaching would-be pilots to fly and wish to add my most heart felt approval of the sentiments expressed therein. I trained for a Limited Commercial License with one of the best and oldest flying organizations in the world and was granted, recently, a license by the Department of Commerce. The methods of teaching the student how to handle a ship were appalling The student is not taught but sworn at and bulldozed until his instinct is aroused, not guided, and he is permitted to solo It is only then that he can stop and study for himself the whys and wherefores and really begin to understand what he is doing In my own case before I could land a ship successfully, it was necessary for me to go to the professor in charge of the ground school and go over the mechanics of landing with him All my instructor could tell me while flying was to watch the horizon and then not to get too near or far from the ground no teaching, just endless tirades that I was doing it wrong but no definite explanation as to how to do it right

These methods are, of course, due to the use of flight instructors who are in themselves excellent flyers but do not have the ability to tell others how they do it nor do they understand the psychology of teaching

I could rant on and on about both flight and ground instruction. However, I will restrain myself and beg you to carry on with your campaign for sound and logical instruction in the aviation industry

DAVID ROBINSON

[Needless to say, Mr Robinson's unhappy experience was by no means typical For every student who has such a complaint a great many could be found who thoroughly enjoyed their flying course and whose relations with their instructors were of the happiest The abusive instructor is very uncommon in the year 1930, even though he may not have entirely disappeared but the instructor who with the best will in the world and with the most admirable flying technique is simply unable to teach is still with us He must either be trained or eliminated.—ED]

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The OX and Pilots

TO THE EDITOR

While so many are condemning the OX-5 Standard and other old types of equipment flyers please let me state a few of my views

First, the statement in the June 7 issue by E. R. Bentley that when someone gets killed in an old crate the damage does not stop with his death I have been barnstorming in this district since May 1926, and have had only two minor crack-ups, which were my own fault In this same length of time there have been three serious wrecks by new production flyers which injured my trade very much Two of these were caused by lack of ability on the pilot's part, and the other by a type of ship not suited for this country.

In my opinion, and I'll sure get "Hell" for saying it most of the crack-ups whether in old or new jobs

ara caused by carelessness, lack of ability, and ignorance on the part of the pilot

If the Department of Commerce wants to improve its requirements for Transport Pilots, let it require that every applicant have 100 hours in a ship owned by himself personally If they would do that, the insurance companies could cut their rates 25 percent and we would have a different type of pilot, because whenever a pilot knows that his chances are ten to one to crack up and that he must pay the expense of repairs he won't take the chance

I agree whole heartedly with Mr Meigs' article in the May 31 issue I like my stunts alone because when you do them with some one who does not approve of them you do a whole lot more damage than you do good

If Mr Story will please read the Department of Commerce statistics of the number of privately owned ships using OX-5's he can see why we cannot do without them, and he might also spend a little time flying a ship powered with one. It will make a better pilot of him. Anyone can fly a high-powered ship, but it takes a good pilot to fly an OX-5 out of a two-by-four field with a cross-wind

If there are any more "Old Timers," come to the rescue of the good "poor" flyers

ROY L. MCCLAIN
Osark Flying Service
Festus, Mo

Editorial Comment

FROM THE DAILY PRESS

Flight Insurance

LIFE INSURANCE companies are within their rights in attaching to new policies a rider rejecting the risk of air travel except conditionally The Court of Appeals has found that such provisions are not inconsistent with the insurance law, which declares that policies shall be incontestable after two years from the date of issue except for non-payment of premiums or for violation of the provisions relating to military or naval service in time of war A New York company applied to the State Superintendent of Insurance for his approval of a rider reading as follows

> "Death as a result of service travel or flight in any species of aircraft, except as a fare paying passenger is a risk not assumed under this policy but if the insured shall die as a result directly or indirectly of such service travel or flight the company will pay to the beneficiary the reserve on this policy"

The Superintendent of Insurance refused to sanction this provision on the ground that it was a departure from the terms of the insurance law. In an opinion writen by Chief Judge Cardozo the rider is declared to be not in conflict with the incontestable clause. The court explained that the incontestable provision is not a definition of the hazards to be borne by the insurer, it means only that within the limits of the coverage the policy shall stand unaffected by any defense that it was invalid in its inception or became void by reason of a breach of conditions "Where there has been no assumption of risk there can be no liability," Judge Cardozo wrote. "The kind of insurance one has at the beginning, that, but no more, one retains until the end" A refusal to accept a risk is declared to be not denied to the insurance companies by the terms of the law —N Y SUN.

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Asininity in the Highest

IT SEEMS unfortunate for the future of aviation development that the industry should be so slow to condemn the futility of stunt flying, with its destructive effect on the mental attitude of prospective passengers While every one admits the definite value of certain maneuvers, such as the tail spin in military work and in instruction flying, these serve only to discourage the sale of flight tickets when performed at airports for publicity purposes No one denies that stunt flying attracts a crowd, but not every one appreciates the fact that it is equally effective in preventing those in the crowd from flying

If airports are to be run for the purpose of collecting parking fees, stunt flying has a very proper place If they are to be run for aviation purposes, stunt flying has no place beyond its use to a limited extent for instruction Among the most perfectly useless types of stunt flying are the efforts to establish new records for consecutive loops Three such reports were carried by the press of the country recently, the one being that of a woman pilot who executed 344 consecutive loops, another that of a man who made 12 consecutive loops in a glider The third was that of the chief instructor of a well-known flying school, who attained the acme of idiocy by completing 585 loops and then crashing as the direct result When pilots of this type can hold their positions, the industry is indeed in a sad plight Not one of these records is of the slightest value beyond giving personal publicity to the pilots who were involved.

It seems unfortunate that the National Aeronautic Association and the Federation Aeronautique Internationale should be so ill-advised as to recognize records of this type as if possessing the same constructive value attained by speed duration and similar records —AMERICAN CITY MAGAZINE.

Abstracts AND *Reviews*

Plywood Beam Webbing

THE DESIGN OF PLYWOOD WEBS FOR AIRPLANE WING BEAMS, *by George W Trayer, N A C A Technical Report No 344*

THE DESIGN of a wooden box beam involves first, the design of the flanges, and second, the design of the webs. The function of the webs of box beams is to resist a very minor portion of the bending moment and the major portion of the shear acting on the beam. To permit the design of webs so as to obtain maximum strength per unit weight, a study of the problem was made at the Forest Products Laboratory, and the results are presented in this report.

Two formulas are recommended for computing the maximum shear stress in a box beam

$$q = \frac{VQ}{It}, \text{ and } q = \frac{V}{at};$$

where q is the shear stress in pounds per square inch, V is the external shear, Q is the statical moment of the cross-sectional area above or below the neutral axis, I is the moment of inertia of the cross-section, t is the total thickness of the webs, and a is the distance between the centers of gravity of the flanges exclusive of the plywood Tests indicate that, with plywood in which the grain of the successive plies is alternately parallel and perpendicular to the axis of the beam, only that portion of the plywood in which the grain is parallel to the axis should be considered in calculating the moment of inertia, I With plywood in which the grain of alternate plies forms angles of $\pm 45°$ with the longitudinal axis of the

beam, one half the thickness of the plywood may be considered in calculating I. In calculating the form factor of a box section with either type of web the total thickness of the plywood should be used.

The basis of comparison for the results of the numerous tests on box and I beams conducted at the Forest Products Laboratory, is the efficiency, the maximum load divided by the beam weight. A curve of the web thickness plotted against the efficiency and shear stress is given for box beams with spruce and yellow poplar webs with the grain running at ±45° to the length of the beam. This curve is divided into three parts, the lower portion is based on the loads that the two flanges will sustain after the web has collapsed, the middle portion represents failure by shear, and the upper right hand portion is calculated on the basis of failure in the compression flange. The intersection of the latter two parts represents the theoretical thickness of the web at which there will be equal likelihood of failure by shear or by compression in the compression flange. The maximum shear stress corresponding to that point is 1,225 pounds per square inch. What actually happens, however, is that beams with a web thickness represented by the intersection of these curves fail in the compression flange although they buckle in the web, and consequently give lower values than those indicated by the intersection. This fact is represented by a fillet joining the two curves. Therefore a maximum shear stress of about 1 175 pounds per square inch is more nearly correct. The maximum efficiency then occurs at a web thickness of approximately 0 13 inches, which corresponds to a shear stress of 1,135 pounds per square inch.

A possible source of difficulty was pointed out. That is the possibility of getting a beam low either in shear or compressive strength when a web thickness that gives equal likelihood of failure by shear or by compression is selected. The chances of getting a dangerous minimum are reduced by using a slightly heavier web with only a slight loss in efficiency.

Consideration of these facts lead to the following recommendations for the design stresses in shear for 45° plywood.

When no diaphragms are used or when the diaphragm spacing exceeds three times the clear distance between the flanges, use four-thirds of the design stress in shear recommended for the species. The actual values for four species are.

Spruce 1,000 pounds per square inch.

Yellow poplar 1,070 pounds per square inch.

True mahogany 1 150 pounds per square inch.

Birch 1 735 pounds per square inch.

For a diaphragm spacing from one and one-half to two and one-half times the clear distance between flanges use five-thirds of the design stress in shear recommended for the species. For a diaphragm spacing up to one and one-half times the clear distance between flanges use double the design stress in shear recommended for the species.

For plywood webs with the plies alternately parallel and perpendicular to the length of the beam, the allowable shear stresses should not exceed 87½ per cent of those recommended for 45° plywood.

A study of the results of shearing tests and static tests of beams lead to the conclusion that plywood webs are most efficient when the grain of one ply is at 90° to the grain in adjacent plies, when the web is so arranged that the grain of half of the materials is at 90° to the grain of the other half and when the grain of all the plies is at ±45° to the longitudinal axis of the beam.

To determine the stress on the glued area it is suggested that the maximum shear in 1 inch of the plywood be divided by the area of contact per inch between the plywood and the flanges. That is $f = \frac{q t'}{d}$, where q is the maximum shear stress in the plywood, t' is the thickness of one web, d is the depth of the flange, and f is the shear stress required. The stress on the glue area when calculated by this method, should not exceed one-fourth the customary allowable design shear stress of the wood being glued. If two different species are being glued together, the allowable shear stress of the weaker species should govern.

New Patents

Airfoil Construction

1 762 701 Harry H Semmes Chevy Chase Maryland, assignor to Bendix Aviation Corp, New York, N. Y. Filed June 19 1928 Serial No 278 188

This patent provides for the elimination of the present day type of rib in an aircraft wing and the substitution of a continuous metal strip interwoven among the spars in such a manner as to provide great rigidity and strength. The entire frame of the wing is first built up with "S" type beams and then the covering is applied. This construction may be adapted to any airfoil.

It is claimed that this type offers a great saving in weight over any form of corrugated construction. It is also claimed that this method can be manufactured with the least amount of expert workmanship and a very low cost.

• • •

Instrument Panel

1 764 854 Carl E. Johnson of Seattle Washington assignor to Boeing Airplane Co., Seattle Washington. Filed July 2 1928 Serial No 275,438

The chief feature of this patent is the arrangement of the instruments on the panel. The panel may be made in such a manner that when reaching predetermined altitude any deviation of the instruments upon the board will be quickly noticed. This is done by placing lines across the instrument panel and arranging it in such a manner that all pointers of the instruments will be coincident with and horizontal to these lines. Each instrument has an arrangement whereby it may be rotated to allow for rapid adjustment. It is claimed that this rotating mechanism prevents any, except intentional rotation of the instrument.

• • •

Landing Hook for Aircraft

1 760 331 Robert J Minshall, Seattle Washington assignor to Boeing Airplane Co Seattle Washington Filed January 16 1929 Serial No 332 790

An improved type of aircraft landing hook is covered by this patent. By means of an ingenious arrangement of cords and pulleys the tail of the aircraft is pulled down with a force equal to that applied to the hook. The hook may be quickly raised or lowered by means of a pulley and cord arrangement controlled by the pilot. The hook itself is constructed of steel tubing and the various pulleys are mounted to it by means of welded fittings. The hook is securely anchored to the frame of the aircraft by means of both a steel bolt and a wire cable.

• • •

Airplane

1 756 231 George E Armington Wickliffe, and Robert G Nightingale Cleveland, Ohio assignors to the Glenn L. Martin Co Cleveland, Ohio Filed November 5, 1927 Serial No 231,246

Lower air resistance and a more practical means of fastening struts to wing spars are the objects of this invention. Special brackets are fastened to the spars of the wings and these brackets protrude from the wing covering up and inside of the struts. Special fittings are riveted to the struts and by means of one bolt the fittings on both the spars and the struts are fastened firmly thus providing a highly efficient and well streamlined strut fitting.

THE BUYER'S LOG BOOK

This Log is prepared by the editors of AVIATION *purely as a service to readers. All items are published free of charge, solely on their news value, and without any advertising consideration whatsoever. Manufacturers are invited to send in material for this section.*

"Ace" Wrench Set

The "Ace", a set of wrenches manufactured by Blackhawk Manufacturing Co, Milwaukee, Wis, is intended especially for aeronautical mechanics and also has many industrial applications. It is made up of 24 units compactly arranged in a sturdy metal case. All of the units have a ⅜ in square lock on lug or handle opening, with the exception of the four box type wrenches.

The set contains a tiny speeder handle, ratchet handle, hinged offset and handle bar, extension bars, 3 in, 10 in and 18 in long respectively, universal joint of 180 deg range, three crow-foot attachments, a release tool which is used on all Blackhawk lock-on wrenches special screw-driver attachment, and seven double hexagon sockets from ⅜ in to ⅝ in. In addition there are four box type wrenches with the following socket openings ⅜, 7/16, ½, 9/16, ⅝, 11/16, and ¾ in —AVIATION, *June 28, 1930*

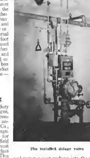
Airport Color Lighting

Reco color accessories for boundary lights, obstruction lights, roof signs, hangar exterior lights, airway beacons and flood lights were recently announced by the Reynolds Electric Co, 2650 West Congress Street, Chicago. The Reco boundary light is used for lining the borders of the landing field and is an all-weather, vapor-proof unit consisting of a natural colored glass hood, socket, and metal casing. This can be supplied in opal and amber, for which the use of 25 watt lamps is recommended, and in green and red with 50 watt lamps.

Color hoods used for obstructions, warnings, radio towers and masts are manufactured by this company. Their use affords a dust and weatherproof fitting and provides support and protection for the lamp. Reco inner color plates fit behind the lens of floodlights and offer a permanent method of securing colored lights. These can be supplied in sizes to fit standard makes of floodlights. The company also offers a line of signalling and contacting equipment —AVIATION, *June 28, 1930*

"Automatic" Deluge System

The hangar deluge system has been devised by the Automatic Sprinkler Corp of America, Cleveland, Ohio to control and extinguish fires in airplane hangars. This is essentially a sprinkler system employing ceiling sprinklers and may also include floor sprinklers. At the outbreak of fire the temperature of the air above the fire rises at an abnormal rate, setting up air pressure in heat actuated devices fastened to the ceiling. This pressure is conveyed by copper tubing to a small flexible diaphragm which trips the deluge valve. An alarm is thus sounded



The installed deluge valve

and water is sent rushing into the overhead and floor sprinklers, deluging the areas. According to the manufacturer, this happens within a split half minute.

The systems can be arranged in independent units, the water supply for each one being controlled by a separate valve. Several different types of installation are available —AVIATION, *June 28, 1930*

New Types Star Compass

Two new types of aircraft compass were recently introduced by Star Compass Co, East Milton, Mass. Type M is especially made for ceiling mounting on cabin planes, and has a height of 3½ in and diameter of 5½ in. Its 3½ in. dial is marked in reverse and reading is accomplished by a mirror mounted on the instrument panel or another convenient location. A similar compass intended for wing mounting and known as Type W has a direct reading dial.

Type B, a 3½ in dual dial compass, has both vertical and horizontal cards, with coinciding markings and graduations. By this arrangement reading of both dials is accomplished from the same indicating point. The height is 4½ in and the width at base is 6½ in. Type BU is the same as Type B, but with indirect lighting from below —AVIATION, *June 28, 1930*

Trade Catalogs

▶ *History and Use of Felt.* How felt was made and used in ancient times is set forth in a recent publication of the Western Felt Works. A brief description of modern methods of manufacture and uses include several applications to the aeronautical industry.

▶ *Construction With Tarmac.* Some of the advantages of Tarmac for airport paving are listed in a recent booklet of the American Tar Products Co. Pictures show the construction process step by step and useful tables are included relating to the quantities of Tarmac and stone required under various conditions.

New Micarta Pulley

The marketing of a new micarta aircraft pulley is announced, to supplement the present line of micarta products manufactured by the Westinghouse Electric & Manufacturing Co. The pulleys are equipped with high grade ball bearings with close fitting dust shields, and are packed with grease at the factory. A new construction method has been used for mounting the bearing, which is believed by the company to have several advantages over the practice of moulding the bearing directly in the pulley.

It is recommended that installation be in protected positions, avoiding direct exposure to dust from the propeller slip streams and mud from the landing gear. The manufacturer states that, if pulleys are correctly installed, they will require no lubrication and have an extremely long life. They carry the maximum safe load for the recommended cable, which will seldom exceed 300 lb —AVIATION *June 28, 1930*

Rummel Aero Spark Plug

The Rummel Aero spark plug now manufactured by All-American Products, Inc, Galion Ohio, is simple in construction and designed to meet replacement needs at moderate cost. It has a light, ringed shell to give good cooling qualities and the porcelain is the "775" made by the Frenchtown Porcelain Company, Frenchtown, N J —AVIATION, *June 28, 1930*

SIDE SLIPS

By
Robert R. Osborn

Mr. E.P.W., recently returned from a trip abroad, brought back an interesting clipping from the London *Tatler*. "While at the Heston Air Park watching the return from the Continent of the party of flying tourists I realized that, if adequate descriptions are to be written of such events, a remedy must be found for one serious omission in the aeronautical vocabulary A search of the Oxford Dictionary reveals that, for the most gregarious of creatures, the air pilot, there is no noun of assembly. A competition was held recently by one of the weekly reviews in which the participants were required to invent nouns of assembly for a number of trades and professions Among the answers there were: a 'squirt' or 'condescension' of chauffeurs, a 'draggle' of charwomen, a 'screw' of income tax collectors, a 'flourish' or 'strut' of actors, and a 'powdering' of typists. But no noun of assembly for aviators was suggested A 'formation' of aviators (with due apologies to the London Club) is too obvious. A 'spin' is better, but I chiefly favor a 'crash' of aviators"

For reasons which do not need to be given, we don't exactly favor a "crash" of aviators, and the other two terms seem inadequate We think that to get the best nouns of assembly it will be necessary to divide pilots into two groups For the younger and newer pilots, who run to whipcord, leather coats riding boots and shiny goggles, we'd suggest a "leather" of young pilots. For the "old boys" who seem to be able to fly remarkably well in sack suits or overalls our suggestion would be a "head wind" of transport pilots. Possibly readers (if any) have some better suggestions

• • •

Mr C F McR of Los Angeles who frequently rises in defense of the California flyers against our attacks comes in quietly this time, with an item from a contemporary magazine on the coast.

"Sets High Mark in Safe Flying"

"fieldyl etao shrd cmffwy vbgk nnnn Air travel is safer than automobile travel on the highways, in the opinion of C W Wright, pilot for the Pickwick Latin American Airways tri-weekly mail, express and passenger line between Los Angeles, Mexico City, Guatemala City and San Salvador."

We all agree with Mr Wright, of course, but there doesn't seem to be any reason to get so het up about it.

• • •

This Week's Amazing Aeronautical Event

"The fishermen ——— both of Marblehead, had just tied up when they saw the plane suddenly plunge into the water It struck with a roar nosed under and came back to the surface 100 feet beyond The two men, who had released their life belts were drenched, but clamored from the cockpit and made their way to the wings, which kept the plane afloat"—Clipping from a Boston paper proving that fishermen have the same complex no matter what they are talking about.

• • •

The New York *Herald-Tribune* recently had an interesting comment "One of the troubles with an oceanic passenger service by air is that dirigibles are comparatively fragile and couldn't withstand many of the bon voyage parties that are customarily held on departing liners"

Another problem to be solved is that of the guests at these farewell parties who become slightly confused and stay on board past sailing time Dropping off into a bobbing rowboat at Sandy Hook is disturbing enough but the thought of a possible forced parachute jump is certain to prevent complete abandon and enjoyment of a dirigible bon voyage party

• • •

Mr W.E.D of Hanover, N H discovered a note in the New York *Times* which furnishes the first suggestion why our Naval Conference delegates were satisfied with the light cruiser situation It is obvious that the lighter fighting ships are going to have better flight performance when we get them outfitted for aerial combat "The Salt Lake City, her four great screws churning the sea into white froth sped astern of the Lexington and followed the carrier into the air"

• • •

The next time we get out to California we're certainly going to make a personal investigation of the wonderful flying that goes on there Meanwhile we think that the N A A should calibrate carefully all instruments and check over all data before allowing any of these records as official The latest was printed in the Oakland *Tribune* and is sent in by Mr. L.T.S. of Piedmont, California "The feat of looping the loop in a glider was accomplished by Edward B Heath of Chicago His glider was towed to an altitude of 12 feet before being released. He made four loops"

• • •

Mr R.L.B of Ft Stockton Texas has discovered a very dangerous aerial maneuver and suggests that we should pass the news along as a warning to pilots An item in the Wichita Eagle had the following among the details describing an accident "The men were taking off—and had attained an altitude of only 100 feet when they turned downward a mistake according to local pilots"

• • •

More evidence showing how hard boiled them there California pilots are "Roosevelt Field L. I May 27th,—Lieut Col. Roscoe Turner and his flying lion Gilmore, roared down the runway at this field this morning and took off for Los Angeles" Note discovered in *The Times*, by R.C of New York City, who thinks the newspapers will soon begin dubbing Mr Turner "Roaring Roscoe" if he continues activities along this line.

• • •

Sometimes it seems that the publicity agents employed by some of the newer aeronautical companies don't exactly know what aviation is all about, but there is never any doubt about their command of the English language The following is a good example—from a news release sent to Aviation by a new air transport line "Gasps of wonder at the immense size and interior comforts of the monoplanes were wrenched from the throats of the huge crowd"

• • •

"Charles G Hill, chairman of the board of the Amazon Cotton Mills at Winston Salem N C, had promised his son Charles any plane he asked for if he became an officer The boy's first choice was a Wright Whirlwind motor that would fly 180 miles an hour The father felt that was too fast and they compromised on a Waco model F, with a speed of 115 miles an hour"—Item found by H P in *N Y Evening Post*

Clearly a case where a merger would be of value, combining the best features of both.

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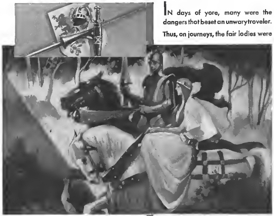

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An advertising inch is measured vertically on one column. 3 columns—30 inches—to a page

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FOR SALE

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FOR SALE. 95 hp English Mark III Cirrus engine. Splendid shape just overhauled. Has had approximately 120 hours. Best offer takes it. Menasco Motors Inc. 6718 McKinley Ave., Los Angeles Calif

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FOR SALE

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FOR SALE. Aristocrat high wing cabin monoplane with Wright J-6 engine licensed, like new. Ship and motor both 40 hours always kept in hangar. Wing tanks compass air speed oversized tires air starter steel propeller cruising speed 90 miles per hour. Reason for selling am buying a larger and faster ship. Price $8,500 10 per cent discount for all cash. List price new was $8,000 including extra equipment only 5 months old. Florida Aircraft Corporation Dunedin Fla

FOR SALE. Brand new J-5 Taper Wing Waco special paint job. Completely equipped. Has 20 hours. Will sacrifice for $5,000 cash. Also Cavalier 2 place cabin monoplane flown 35 hours $2,400 cash. G. W. McCauley Hangar 31 Roosevelt Field Garden City L. I. N. Y.

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We have for sale the following used planes which have been accepted or are offered in trade on new Bellanca pace makers:

Name and Model	*Capacity*	*Engine*	*Approx. Hours*	*Location*	*Price*
Waco Taper Wing	3 Place	Wright J-5	250	Chicago	$5000.00
Cessna BW5	4 Place	Wright J-5	250	New Castle, Del.	3500.00
Fairchild FC2	5 Place	Wright J-5	165	Maryland	4950.00
Stinson	6 Place	Wright J-5	300	Illinois	5500.00
Bellanca CH	7 Place	Wright J-5	172	New Castle, Del.	6600.00
Bellanca CH	7 Place	Wright J-5	New	New Castle, Del	on application

ALL IN GOOD CONDITION
ALSO SEVERAL NEW AND USED WRIGHT J-5 ENGINES
WIRE OR WRITE
BELLANCA AIRCRAFT CORPORATION
NEW CASTLE, DEL.

SUPER PARASOL
Have left one 1929 brand new factory built. Never flown will sacrifice at $375 less motor.
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FOR SALE
Wasp Fokker Special Universal

Ship and engine completely reconditioned at factory this winter. Wasp in arrange which makes ship especially suitable for high altitude flying, for taking loads in and out of small fields. Interior in walnut veneer and broadcloth complete with three chairs and couch, lavatory and baggage compartment, landing and navigation lights, 160 gallons gasoline capacity. Address inquiries,
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1130 First National Bank Building
Denver, Colorado

FOR SALE

FOR SALE J 1 Standard OX motor, good condition Mitchell Auto Co., Bridgeton Indiana

FOR SALE—1929 K 9 100 hp Kinner School motor Two Scintilla magnetos and a Stromberg carburetor Will ship freight C O D $280 Assembled and in A 1 running order Motor has been turned Carl Falke 848 Smith Street, Milwaukee, Wis.

FOR SALE New Curtiss Gypsy Moth safety slotted wings Has been used for display purposes only Pierment Motor Co 6061 Baum Blvd Pittsburgh Pa

FOR SALE Travel Air biplane oematl job Completely overhauled New licence NC 3760 New 3 motor Hamilton steel propeller brakes and full set of instruments Price $3 750 Jesse S Anderson 656 Maple Avenue, Newark, Ohio

FOR SALE Fleet biplane Warner 110 hp motor Ship 250 hours Motor 150 hours Licensed $2 900 Chase Stone Box 91 Colorado Springs Colo

FOR SALE Golden Eagle monoplane with Velie M 5 motor In good condition Ideal for builders sale thing Bargain price Joe Bessee Kernersville N C Route 1

FOR SALE Waco 10 OX 5 motor 225 hours Excellent condition recently completely overhauled Always had considerate use Complete insurance Excellent for club as it is owned by corporation which will go with it if desired $1,200 for entire business Charles L Morris 230 Prospect St New Haven Conn

DETROIT AERO MOTORS Co
8535 49 Townsend Ave Detroit, Mich
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2—J 4 hp ost Wright Whirlwinds
1—OX5 Curtiss
1—Siep Velie
1—Kinner 5—Warner Scarabs
4—J 5 Wright Whirlwinds.
Write for information and prices on motor req
J 4 and J 5 motor parts

FOR IMMEDIATE SALE

SPECIAL LONG DISTANCE BELLANCA

RANGE : 5000 MILES IN 42 HOURS

We have been commissioned to sell this ship by the owner who is unable to use it for the purpose intended owing to circumstances beyond his control.

SPECIAL FEATURES

SPECIAL OVERSIZE WINGS OF 300 SQUARE FEET AREA.

Engine—Wright J-6 300 hp 9-cylinder especially selected and super-powered during assembly at the Wright Aeronautical Corporation plant Special carburetors bearing lubrication from the cockpit.

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Fuselage tanks equipped with eight inch diameter quick opening and closing dump valves operated from the cockpit the dumping feature permitting the tanks to be used in float the airplane is water

All gasoline lines and connections tested and specially secured with double gasoline line from carburetor to engine

Fuel feed direct to carburetor from fuselage tanks or pumped through wing tanks for gravity feed to engine or vice versa. Motor engine pump or hand pump interchangeably

Navigation lights and complete interior lighting where necessary with 12 amp hr storage battery

Instruments —Bulher Magnetic Compass, Pioneer Earth Inductor Compass, Pioneer Turn Indicator, Pioneer Turn and Bank Indicator, Altimeter, Air Speed Indicator, Oil Thermometer, Oil Pressure Gauge, Tachometer, Bank and Turn Indicator, Clock. Plane is also equipped with gasoline level gauges

BELLANCA AIRCRAFT CORP. NEW CASTLE DEL.

Bristol Cherub Motor

1—Practically new Has had only about 10 hrs use $1 800 will sell for $700

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FS-600 Aviation
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FOR SALE

FOR SALE OX 5 Waco 9 N C licensed 10 hours since complete overhaul Special paint job A sacrifice at $1 250 Pharion Aircraft Co., 1133 Pinewood Ave., Toledo Ohio

FOR SALE Travel Air 6-place cabin monoplane type 6000B with J6 300 motor also real roam Has had but 70 hours. Price $10 000 You save over $4 000. Ward S Lent, Poughkeepsie, N Y

FOR SALE Half interest in Swallow with free instructions For further details write Wm Klingenberg Jr 212 Dundee Ave Barrington Ill

FOR SALE OX 5 super standard just overhauled and last flown $300 One OX-5 Thomas Morse scout plane overhauled from ground up like new $850 will sell less motor. Scintilla 8-cylinder magneto $30 J 1 standard wing struts $1 each control wires $1 turnbuckles 10c new spark plugs 25c new navigation lights $10 set 1 pair Dixie magnetos $25 real bot, 1 Thomas Morse less motor but in good shape $250 J J Andrulis, Waukegan Ill

HISSO 180 hp., French built in new condition with hub-starks and spares $200 cash Fabry Motor Co., Gardner Ill

J 6 Tappered Wing Waco for sale has been flown 210 hours, perfect shape motor just factory overhauled real buy $4 800 V A Richard Box 989 Schenectady N Y

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Owing to the Holiday, July 4th, the *"Searchlight"* pages of the July 5 issue of

AVIATION

will close two days in advance of the regular schedule

Advertisers will be cooperating with us by sending new advertisements or changes of copy early.

FINAL CLOSING TIME
10 A M. Friday, June 27, 1930

FOR SALE

THREE unverted 220 Hispano engines New direct drive and interchangeable with Model E all dimensions Department of Commerce Approval Guy Carroll 5133 27th Avenue South Minneapolis Minnesota

WACO 9 OX 5 revs 1 400 complete overhauled Handles perfectly $750 Crane Garage Toledo Ohio

VELIE monocoupe demonstrator new last August A 1 condition, $1 800 Used 83 hours Equipped with steel propeller air speed Bendix wheels and brakes Sacrifice at $1 950 One privately owned OX 5 Waco 10 total time 107 hours Motor just rebuilt Ship is finished in a beautiful maroon and gold. Cannot be told from new Owner buying closed job For quick sale priced at $1 850 Also several other planes Call or write Mohawk Airways, Inc., Albany New York

EQUIPMENT WANTED

IRVIN seat pack Must ship Subject to inspection and re-packing Will pay $125 Illinois Flying School 6791 So Chicago Ave Chicago Ill Care of Dewey Biggs

SALMSON Z-9 slightly used radial engine complete with propeller etc. W Stewart 253 W 64th St New York

WANTED Right side of landing gear for Waco 9. Also propeller with spinner for OX 5 plane E L. Whitlock Davenport Center N Y

WANTED J 5 or J-4 Wright Whirlwind motor cheap for cash For sale 1929 licensed Davis V-3 monoplane will take automobile as part payment. Harry Brown 138 Ringold St Dayton Ohio

WANTED Licensed Bird Fleet or Great Lakes plane with or without motor State lowest cash price Must be fair condition and reasonable Gordon Harrington Marshall Missouri

WANTED Will pay $1 100 cash for a light three place pontoon equipped biplane with dual controls Must be of an approved type Send photograph and full description to South Shore Flying Club, Box 123 North Scituate Mass

TRADE

WILL exchange late model, 28 foot 40 mile per hour Hacker speed boat perfect condition horse power motor for late model open airplane Located vicinity New York City FS 580 Aviation, Tenth Ave at 36th Street, New York

WILL trade seat type Irving silk chute perfect condition one and one half years old for a back pack type as good Warren A Field Stratford Conn

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LICENSED airplane and engine mechanic desires position with reliable firm in the East Eight years army and air mail experience. PW 872 Aviation, 520 No Michigan Ave., Chicago, Ill

180-HOUR pilot L C license passenger flying flying for photographer and cross-country experience, willing to work for additional time. Parks graduate careful flyer go anywhere References furnished Good salesman Chas Hosenknecht, 930 W 2nd St., Hazleton, Pa

Will Trade Brand New

80 H P Genet Powered Barling

Never flown (in original factory crate) Prefer ship powered with J 5 five-cylinder Wright What have you?

M 502 Aviation
Tenth Ave at 36th St New York City

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TRANSPORT pilot, 2 200 hours eight years experience United States and foreign service on all types Prefer lots of flying Must be with reliable company PW 877 Aviation 520 No Michigan Ave. Chicago Ill

TRANSPORT pilot Army trained Five years commercial experience 1 400 hours married One year manager government approved school Now employed. Desires connection with well established company PW 878 Aviation 520 No Michigan Ave., Chicago Ill.

TRANSPORT pilot with one thousand hours married will go anywhere Will accept position as co pilot on big jobs. PW 879 Aviation Tenth Ave at 36th Street New York

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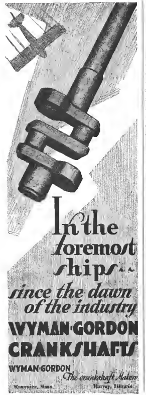

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